

Lecture 5- Class C Subnetting

1. What is Subnetting?

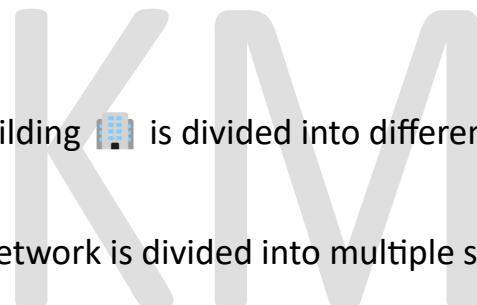
Subnetting means dividing **one large network** into **multiple smaller networks** .

Why Subnetting is Used?

- Better **network management**
- Improved **security** 
- Reduced **network traffic** 
- Efficient use of IP addresses

Daily Life Example:

- One big office building  is divided into different departments (HR, IT, Admin)
- Same way, one network is divided into multiple sub-networks



2. Class C Network Basics

- Class C network has **256 total IP addresses**
- Usable IPs = **254**

◆ Reserved IPs

- **First IP** → Network ID (e.g. .0)
- **Last IP** → Broadcast ID (e.g. .255)

Purpose

- **Network ID:** Identifies the network 
- **Broadcast ID:** Used to send data to all devices in the subnet 



3. What is CIDR?

CIDR (Classless Inter-Domain Routing) is a method to represent:

- Network bits
- Subnet mask

📌 Format

IP / Number of Network Bits

Example:

- /24 → 24 bits for network
- /25 → 25 bits for network

👉 CIDR helps in **flexible subnetting** without strict class rules



4. Subnetting Example: 192.168.10.0/25

◆ Step 1: Identify Base Network Class

- 192.168.x.x → **Class C**
- Default mask = **/24**

Class C structure:

- First 3 octets → Network
 - Last 1 octet → Host
-

◆ Step 2: Borrow Bits

- Default mask = /24
- Given mask = /25

👉 Borrowed **1 bit** from host part

- Network bits = 25
- Host bits = 7

◆ Step 3: Calculate Total Subnets

Formula:

Number of Subnets = 2^n

- n = borrowed bits = 1

👉 Subnets = $2^1 = 2$

◆ Step 4: Calculate Hosts per Subnet

Formula:

Hosts per Subnet = $2^n - 2$

- Remaining host bits = 7

👉 Total IPs = $2^7 = 128$

👉 Usable Hosts = **126**

◆ Step 5: Subnet Ranges

■ Subnet 1

- Network ID: 192.168.10.0
- First Usable: 192.168.10.1
- Last Usable: 192.168.10.126
- Broadcast: 192.168.10.127

■ Subnet 2

- Network ID: 192.168.10.128
 - First Usable: 192.168.10.129
 - Last Usable: 192.168.10.254
 - Broadcast: 192.168.10.255
-



5. Subnetting: 192.168.10.0/26

◆ Borrowed Bits

- $/24 \rightarrow /26$
- Borrowed = 2 bits

◆ Total Subnets

- $2^2 = 4$ subnets

◆ Hosts per Subnet

- Remaining bits = 6
- Total IPs = $2^6 = 64$
- Usable = 62

◆ Subnet Ranges

Subnet	Network ID	First IP	Last IP	Broadcast
1	.0	.1	.62	.63
2	.64	.65	.126	.127
3	.128	.129	.190	.191
4	.192	.193	.254	.255



6. Subnetting: 192.168.10.0/27

◆ Borrowed Bits

- $/24 \rightarrow /27$
- Borrowed = 3 bits

◆ Total Subnets

- $2^3 = 8$ subnets

◆ Hosts per Subnet

- Remaining bits = 5

- Total IPs = $2^5 = 32$
- Usable = **30**

◆ **Subnet Ranges (Jump = 32)**

Subnet Network ID First IP Last IP Broadcast

1	.0	.1	.30	.31
2	.32	.33	.62	.63
3	.64	.65	.94	.95
4	.96	.97	.126	.127
5	.128	.129	.158	.159
6	.160	.161	.190	.191
7	.192	.193	.222	.223
8	.224	.225	.254	.255



7. FLSM (Fixed Length Subnet Mask)

- All subnets have **same subnet mask**
- All subnets have **equal number of hosts**



Used in **simple and structured networks**



8. Subnetting Cheat Sheet

Group Size	Subnet Mask	CIDR
128	255.255.255.128	/25
64	255.255.255.192	/26
32	255.255.255.224	/27
16	255.255.255.240	/28
8	255.255.255.248	/29
4	255.255.255.252	/30
2	255.255.255.254	/31
1	255.255.255.255	/32



CIDR Reference (Octet Wise)

CIDR	Octet Used
/25–/32	4th Octet
/17–/24	3rd Octet
/9–/16	2nd Octet
/1–/8	1st Octet



Key Points to Remember

- Subnetting divides networks
- Network & Broadcast IPs are reserved
- CIDR defines network bits
- FLSM uses equal subnet size
- Practice makes subnetting easy 🤓

◆ 1 Chapter Summary

Subnetting is the process of dividing **one large network** into **multiple smaller networks** to improve performance, security, and IP utilization ✅.

In **Class C networks**, we start with **256 IP addresses**, out of which:

- **254 are usable**
- **1 Network ID** (first IP)
- **1 Broadcast ID** (last IP)

Using **CIDR (Classless Inter-Domain Routing)** like /25, /26, /27, we:

- Borrow bits from the **host portion**
- Create **multiple subnets**
- Control **number of subnets & hosts per subnet**

Key calculations involve:

- **Number of subnets = 2^n**
- **Hosts per subnet = $2^n - 2$**

Subnetting types like **FLSM** ensure **equal subnet sizes**, making networks easy to manage 🧠.

👉 This chapter builds the **foundation of real-world networking**, routing, VLANs, and IP planning 💪🌐

◆ 2 Chapter Conclusion 🎯

Subnetting is one of the **most important skills** for any network engineer



By mastering **Class C subnetting**, you can:

- Design efficient networks 🏗️
- Reduce unnecessary broadcast traffic ⚡
- Improve security by isolating departments 🔒

- Save IP addresses (very important in IPv4 shortage 

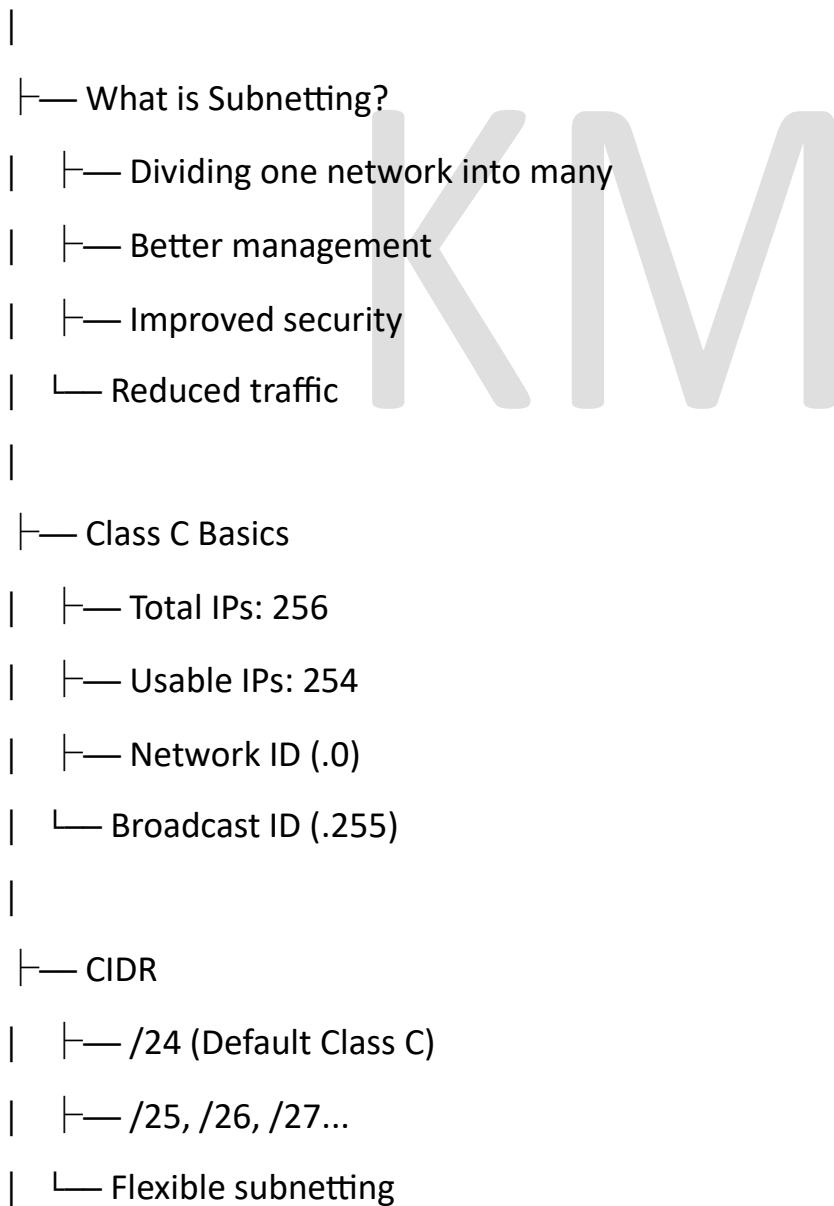
Understanding **CIDR**, **subnet masks**, **network IDs**, **broadcast IDs**, and **host calculation** clearly shows the interviewer that:

- You don't just memorize formulas
- You actually **understand how networks work**

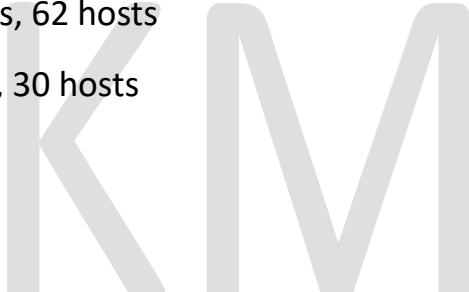
 **Practice + logic = subnetting becomes automatic**  

◆ **3 Detailed Mind Map**

Class C Subnetting



- |
 - |— Subnetting Process
 - | |— Identify class
 - | |— Borrow host bits
 - | |— Calculate subnets
 - | |— Calculate hosts
 - | |— Find subnet ranges
 - |
 - |— Examples
 - | |— /25 → 2 subnets, 126 hosts
 - | |— /26 → 4 subnets, 62 hosts
 - | |— /27 → 8 subnets, 30 hosts
 - |
 - |— FLSM
 - | |— Equal subnet size
 - | |— Same subnet mask
 - | |— Simple network design
 - |
 - |— Key Formulas
 - |— Subnets = 2^n
 - |— Hosts = $2^n - 2$



◆ 4 Q & A

❓ Q1. What is Subnetting?

Answer:

Subnetting is the process of dividing a large network into multiple smaller networks to improve performance, security, and IP utilization ✅.

❓ Q2. Why do we use subnetting?

Answer:

Subnetting is used to:

- Reduce network congestion 🚻
 - Improve security 🔒
 - Manage large networks easily 🏢
 - Use IP addresses efficiently 💡
-

❓ Q3. How many IP addresses are there in a Class C network?

Answer:

A Class C network has **256 IP addresses**, out of which **254 are usable**.

The first IP is **Network ID**, and the last IP is **Broadcast ID**.

❓ Q4. What is Network ID?

Answer:

Network ID identifies the network itself **ID**.

It is the **first IP address** in a subnet and cannot be assigned to any device.

❓ Q5. What is Broadcast ID?

Answer:

Broadcast ID is used to send data to **all devices in a subnet at once** 🎤. It is the **last IP address** of the subnet.

❓ Q6. What is CIDR?

Answer:

CIDR (Classless Inter-Domain Routing) is a method to represent:

- Network bits
- Subnet mask

Example: /24, /26, /27

It allows **flexible subnetting without class limitations** ⚡.

❓ Q7. What does /25 mean in CIDR?

Answer:

/25 means:

- 25 bits are used for the network
 - 7 bits are left for hosts
 - Total IPs = 128
 - Usable hosts = 126
-

❓ Q8. How do you calculate number of subnets?

Answer:

Formula:

👉 **Number of subnets = 2^n**

Where n = number of borrowed bits

? Q9. How do you calculate hosts per subnet?

Answer:

Formula:

👉 **Hosts per subnet = $2^n - 2$**
(-2 for Network ID & Broadcast ID)

? Q10. Explain subnetting of 192.168.10.0/25

Answer:

- Borrowed bits: 1
- Subnets: 2
- Hosts per subnet: 126

Subnet 1:

- Network: .0
- Broadcast: .127



Subnet 2:

- Network: .128
 - Broadcast: .255
-

? Q11. What is the subnet mask for /26?

Answer:

Subnet mask for /26 is:

👉 **255.255.255.192**

? Q12. How many subnets and hosts in /27?

Answer:

- Borrowed bits: 3
- Subnets = $2^3 = 8$

- Hosts per subnet = 30
-

❓ Q13. What is FLSM?

Answer:

FLSM (Fixed Length Subnet Mask) means:

- All subnets have the **same subnet mask**
- All subnets have **equal number of hosts**

Used in simple and structured networks .

❓ Q14. What is the jump size in subnetting?

Answer:

Jump size = **Group size**

Example:

- /26 → Jump = 64
- /27 → Jump = 32

It helps find subnet ranges quickly .



❓ Q15. Why are Network & Broadcast IPs not usable?

Answer:

Because:

- Network ID identifies the subnet
- Broadcast ID sends data to all hosts

They have **special purposes** and cannot be assigned .

❓ Q16. Which octet changes in Class C subnetting?

Answer:

In Class C subnetting:

 **4th octet** is used (/25–/32)

? Q17. Is subnetting important for real networks?

Answer:

Yes **100**

Subnetting is used in:

- Offices
- Data centers
- ISPs
- Cloud networks

Without subnetting, networks become slow and unmanageable .

