

## **PART-A Micro-Project Proposal**

### **Title of Micro-Project: IP Addressing and Subnetting.**

#### **1.0 Brief Introduction:**

IP addressing is a system that provides a unique identifier, called an IP address, to each device connected to a network that uses the Internet Protocol (IP). An IP address consists of a series of numbers, separated by dots, which are used to identify the network and the device on that network. IP addressing is essential for devices to communicate with each other over local and wide area networks.

Subnetting, on the other hand, is the process of dividing a large network into smaller sub-networks, known as subnets. Each subnet has its own unique network address and a range of IP addresses reserved for the devices connected to it. Subnetting improves network performance, security, and management, as it allows for better organization and management of devices on the network.

IP addressing and subnetting is used to create an efficient and organized network. By using these concepts, network administrators can assign IP addresses to devices, divide large networks into smaller subnets, and manage network traffic and security policies. Understanding IP addressing and subnetting is essential for anyone involved in computer networking, from network administrators to IT professionals.

#### **2.0 Aim of the Micro-Project:**

- To understand the concept of IP Addressing and Subnetting.

#### **3.0 Intended Course Outcomes:**

1. Analyzed the functioning of data communication and computer network.
2. Select relevant transmission media and switching techniques as per need.
3. Configure various networking devices.
4. Configure different TCP/IP services.
5. Analyse the transmission errors with respect to IEEE standards.

## 4.0 Literature Review:

- Books:

- 1) "Computer Organization and Design" by David A. Patterson and John L. Hennessy.
- 2) "Computer Networks" by Andrew S. Tanenbaum and David J. Wetherall.
- 3) "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne.
- 4) "Database Systems: Design, Implementation, and Management" by Carlos Coronel, Steven Morris, and Peter Rob.
- 5) "Data Structures and Algorithms in Java" by Michael T. Goodrich and Roberto Tamassia.

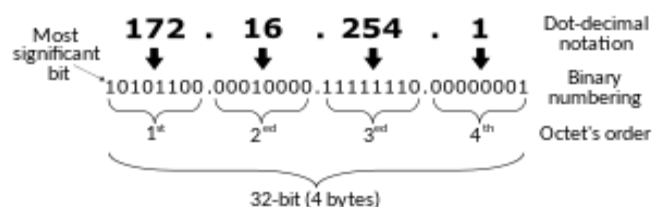
- Websites:

- 1) Codecademy: <https://www.codecademy.com/>
- 2) W3Schools: <https://www.w3schools.com/>
- 3) GeeksforGeeks: <https://www.geeksforgeeks.org/>
- 4) Techopedia: <https://www.techopedia.com/>
- 5) Oracle: <https://www.oracle.com/database/what-is-database/>

## 5.0 Proposed Methodology:

**IP Addressing:** An IP (Internet Protocol) address is a unique numerical label assigned to every device that is connected to a computer network that uses the Internet Protocol for communication. The IP address serves two main purposes. Firstly, it provides a way for devices to identify and communicate with each other over a network. Secondly, it helps to ensure that data is sent to the correct device on the network. There are two types of IP addresses: IPv4 and IPv6. IPv4 addresses are made up of four sets of digits, each set ranging from 0 to 255, separated by dots.

**Example:** The IPv4 address is 192.168.0.1. IPv6 addresses, on the other hand, are longer and are made up of eight groups of four hexadecimal digits separated by colons. An example of an IPv6 address is 2001:0db8:85a3:0000:0000:8a2e:0370:7334.



Decomposition of an IPv4 address from [dot-decimal notation](#) to its binary value

IP addresses can be either static or dynamic. Static IP addresses are manually assigned to a device and do not change, while dynamic IP addresses are assigned automatically by a network's Dynamic Host Configuration Protocol (DHCP) server and can change periodically. In order for devices to communicate with each other over the internet, their IP addresses must be unique. This is why IP addresses are managed by the Internet Assigned Numbers Authority (IANA), which allocates blocks of IP addresses to Regional Internet Registries (RIRs), who in turn allocate them to Internet Service Providers (ISPs) and other organizations.

**IPv4 Addressing** A core function of IP is to provide logical addressing for hosts. An IP address provides a hierarchical structure to both uniquely identify a host, and what network that host exists on. An IP address is most often represented in decimal, in the following format:

158.80.164.3

An IP address is comprised of four octets, separated by periods:

First Octet	Second Octet	Third Octet	Fourth Octet
158	80	164	3

Each octet is an 8-bit number, resulting in a 32-bit IP address. The smallest possible value of an octet is 0, or 00000000 in binary. The largest possible value of an octet is 255, or 11111111 in binary. The above IP address represented in binary would look as follows:

First Octet	Second Octet	Third Octet	Fourth Octet
10011110	01010000	10100100	00000011

### Decimal to Binary Conversion

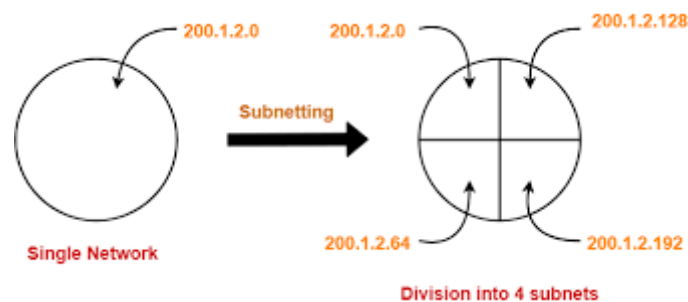
The simplest method of converting between decimal and binary is to remember the following table:

128	64	32	16	8	4	2	1
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To convert a decimal number of 172 to binary, start with the leftmost column. Since 172 is greater than 128, that binary bit will be set to 1. Next, add the value of the next column ( $128 + 64 = 192$ ). Since 172 is less than 192, that binary bit will be set to 0. Again, add the value of the next column ( $128 + 32 = 160$ ). Since 172 is greater than 160, that binary bit will be set to 1. Continue this process until the columns with binary bits set to 1 add up to 172:

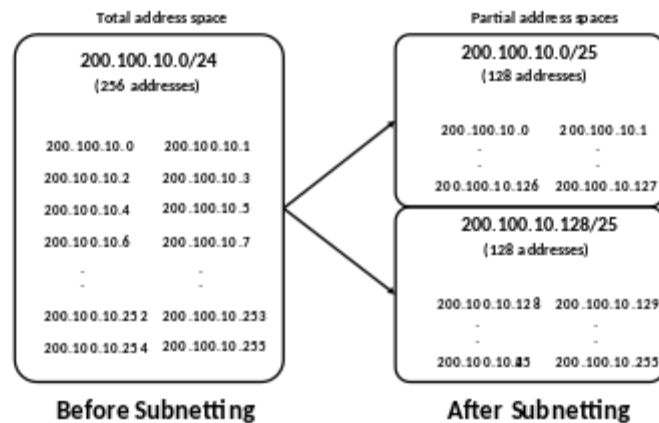
Decimal	128	64	32	16	8	4	2	1
Binary	1	0	1	0	1	1	0	0

**Subnetting**: It is a technique used to divide a larger network into smaller, more manageable sub-networks or subnets. It is an important concept in computer networking that helps to optimize network performance and improve security. When a network is divided into subnets, each subnet is assigned a unique subnet mask, which is used to identify the network address and the host address range for that subnet. A subnet mask is a 32-bit number that is represented in dotted decimal notation, just like an IP address. The subnet mask divides the IP address into the network ID and the host ID.



For example: consider an IPv4 address of 192.168.1.1 with a subnet mask of 255.255.255.0. In this case, the first three octets (192.168.1) represent the network ID, while the last octet (1) represents the host ID. The subnet mask of 255.255.255.0 means that the first three octets are fixed, and the last octet can vary from 0 to 255, allowing for up to 254 hosts on this subnet.

The below diagram shows concept of subnetting the IPv4 address space 200.100.10.0/24, which contains 256 addresses, into two smaller address spaces, namely 200.100.10.0/24 and 200.100.10.128/25 with 128 addresses each.



Subnetting is typically used to improve network performance and reduce network congestion by limiting the number of devices that can communicate on a single network segment

## 6.0 Resources Required:

Sr. No.	Name of Resource/Material	Specifications	Qty	Remarks
1.	Computer	OS: Windows 11 (64-bit) Processor: Intel i7 11 <sup>th</sup> Generation RAM: 16 GB	1	
2.	Documentation	Microsoft word	1	

## 7.0 Action Plan:

Sr. No	Detail of Activity	Planned Start date	Planned Finish Date	Name of responsible team members
1.	Data Collection	08/02/23	15/02/23	Deore Samarthya Ravindra
2.	Analysis	15/02/23	22/02/23	Jain Ekta Vinod
3.	Design	22/02/23	01/03/23	Gangurde Suprabha Dinesh
4.	Development	01/03/23	08/03/23	Makhija Dhruv Harish
5.	Report Writing	08/03/23	15/03/23	Patil Rasika Sunil
6.	Presentation	15/03/23	29/03/23	All Menbers

