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| **Course Name:** | **Computer Communication and Networking** | **Semester:** | **VI** |
| **Date of Performance:** | **18 / 03 / 2025** | **Batch No.:** | **B - 2** |
| **Faculty Name:** | **Dr. Sudha Gupta** | **Roll No.:** | **16014022050** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** | **\_\_\_ / 25** |

**Experiment No: 6**

**Title:** **To implement IP V4 address and subnetting using cisco packet tracer**

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| **Aim and Objective of the Experiment:** |
| To learn and implement IPV4 and subnetting usingcisco packet tracer.   * To study IPV4 and its different class * To study and learn Router configuration and subnetting |

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| **COs to be achieved:** |
| **CO3:** Discuss IP Addressing and Routing Algorithm |

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| **Theory:** |
| IPv4 (Internet Protocol version 4) address is 32 bit address that uniquely and universally defines the connection of a device ( for example, computer or a router ) to the internet. IPv4 addresses are unique. They are unique in the sense that each address defines one and only one connection to the internet. Two devices on the Internet can never have the same address at the same time.  IPv4 protocol that defines addresses has an address space. An address space is the total number of addresses used by the protocol. If a protocol uses N bits to define an address, the address space is 2N  Because each bit can have two different values (0 or 1) and N bits can have 2N values.  There are two types of prevalent notations used to represent IPv4 address.  Binary notation and dotted decimal notation.   1. **Binary notation:** In binary notation, the IPv4 address is displayed as 32 bits. Each octet is often referred to as a byte. Therefore, IPv4 address is 32-bit address or 4-byte address. IPv4 notation in binary form   11000000.10101000.00100101.11001000   1. **Dotted decimal notation:** To make the IPv4 morecompact and easier to read, Internet addresses are usually written in decimal form with a decimal point separating the bytes. Representation of IPv4 in decimal notation.   192.168.37.200  **Subnetting:**  Process of dividing an IP network in to sub divisions is called subnetting. Subnetting divides an IP address in to two parts as the network (or routing prefix) and the rest field (which is used to identify a specific host). CIDR notation is used to write a routing prefix. This notation uses a slash (/) to separate the network starting address and the length of the network prefix (in bits). For example, in IPv4, 192.60.128.0/22 indicates that 22 bits are allocated for the network prefix and the remaining 10 bits are reserved for the host address. In addition, routing prefix can also be represented using the subnet mask.  255.255.252.0 (11111111.11111111.11111100.00000000)  is the subnet mask for 192.60.128.0/22 . Separating the network portion and the subnet portion of an IP address is done by performing a bitwise AND operation between the IP address and the subnet mask. This would result in identifying the network prefix and the host identifier.   |  |  |  | | --- | --- | --- | | **Class** | **Start address** | **Finish address** | | A | 0.0.0.0 | 126.255.255.255 | | B | 128.0.0.0 | 191.255.255.255 | | C | 192.0.0.0 | 223.255.255.255 | | D | 224.0.0.0 | 239.255.255.255 | | E | 240.0.0.0 | 255.255.255.255 | |

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| **Stepwise-Procedure:** |
| 1. Create a network with switches and PCs using Cisco packet tracer. 2. Add IP address and default subnet mask. 3. Ping from one terminal to another. 4. Change the subnet mask and IP addresses. 5. Ping from one terminal to another appropriate terminal. |

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| **Observation Table:** |
| **Screenshots:**  **Simulation Screenshots:**  Network Connections:      Message reaches router2:    Message reaches the other router:    Message reaches destination:    Acknowledgement is received:    Successful process:    Static routing: |

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| **Post Lab Subjective/Objective type Questions:** |
| 1. **Find the subnet mask of following IP address.**   The subnet mask depends on how the IP address is classified and used in networking.   1. **117.10.10.20**   This is a Class A IP address (since the first octet is between 1 and 126).  Default Subnet Mask: 255.0.0.0.   1. **255.0.0.0**   This is already a subnet mask, used by Class A networks by default.   1. **State the advantage of sub netting.**   Subnetting provides several benefits, including:   * Efficient IP Address Utilization – Prevents wastage of IP addresses by dividing a large network into smaller sub-networks. * Improved Network Performance – Reduces congestion by limiting broadcast traffic within a subnet. * Better Security – Enhances security by isolating different departments or groups within an organization. * Simplifies Network Management – Makes troubleshooting and administration easier by dividing a large network into manageable segments.  1. **State the importance of look back address in IPv4 addressing.**   The loopback address (127.0.0.1 to 127.255.255.255) is used for testing and troubleshooting within a host system.   * It allows a device to send data to itself for network testing and debugging. * Ensures that the TCP/IP stack is working properly without requiring a physical network connection. * Helps developers and system administrators check network configurations and services locally. |

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| **Conclusion:** |
| In this experiment, we successfully implemented IPv4 addressing and subnetting using Cisco Packet Tracer, ensuring efficient network segmentation and communication. This demonstrated the practical application of subnetting in optimizing IP address allocation and improving network performance. |

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| **Signature of faculty in-charge with Date:** |