Part B

MICRO PROJECT PROPOSAL

I. Aim/Benefits of Microproject :

Aim : Create Ipv4 Based Small Network using Simulator

Benefits :

- The main objective of this project is to familiarize with ipv4 based small network using Simulator
- We can see detailed information about packets within a network

II. Course Outcomes Addressed :

CO1 : Use basic concepts of networking for setting-up computer networks.

CO4 : Configure the different TCP/IP services.

III. Actual Methodology:

In this project we study about how to create a simulation using ipv4. Separate IP classes are used for different types of networks. IPv4 addresses are **32-bit numbers**. We study about all ipv4 characteristics**.**

IV. Brief Introduction:

Internet Protocol hierarchy contains several classes of IP Addresses to be used efficiently in various situations as per the requirement of hosts per network. An IPv4 address class is **a categorical division of internet protocol addresses in IPv4-based routing**.

V. Action Plan:

Sr. No.	Details of Activities	Plan start Date	Plan finished Date	Name of Responsible Team Members
1.	Formation of project and allocation of project title given by teacher			All Team Members
2.	Conduct Information search about the project for requirement analysis of the project			All Team Members
3.	Acquire the Information from the teacher			All Team Members
4.	Select the Information from the book and internet			All Team Members
5.	Actual project assembling			All Team Members
6.	Arrange all the data and Report the preparation			All Team Members
7.	Submission of the project			All Team Members

VI. Resources Required

Sr. No	Name of Resource/Material	Specifications	Quantity	Remark
1.	Software	MS Word, Cisco Packet Tracer	1	-
2.	Book Referred	-	-	-

• What is IPv4

IPv4 stands for **Internet Protocol version 4**. It is the underlying technology that makes it possible for us to connect our devices to the web. Whenever a device accesses the Internet, it is assigned a unique, numerical IP address such as 99.48.227.227. To send data from one computer to another through the web, a data packet must be transferred across the network containing the IP addresses of both devices. **Class C** addresses are used in small local area networks (LANs). Class C allows for approximately 2 million networks by using the first three octets for the network ID. The Internet Protocol version 4 (IPv4) is **a protocol for use on packet-switched Link Layer networks** (e.g. Ethernet). IPv4 provides an addressing capability of approximately 4.3 billion addresses. The Internet Protocol version 6 (IPv6) is more advanced and has better features compared to IPv4. The Internet Protocol version 4 (IPv4) is **a protocol for use on packet-switched Link Layer networks (e.g. Ethernet)**. IPv4 provides an addressing capability of approximately 4.3 billion addresses. The Internet Protocol version 6 (IPv6) is more advanced and has better features compared to IPv4.

• Size of IPv4 in networking

32-bit

IPv4 addresses are **32-bit** numbers that are typically displayed in dotted decimal notation. A 32-bit address contains two primary parts: the network prefix and the host number. All hosts within a single network share the same network address.

• Classes of IPv4 Addresses

With an IPv4 IP address, there are five classes of available IP ranges: **Class A, Class B, Class C, Class D .** while only A, B, and C are commonly used. Each class allows for a range of valid IP addresses, shown in following table:

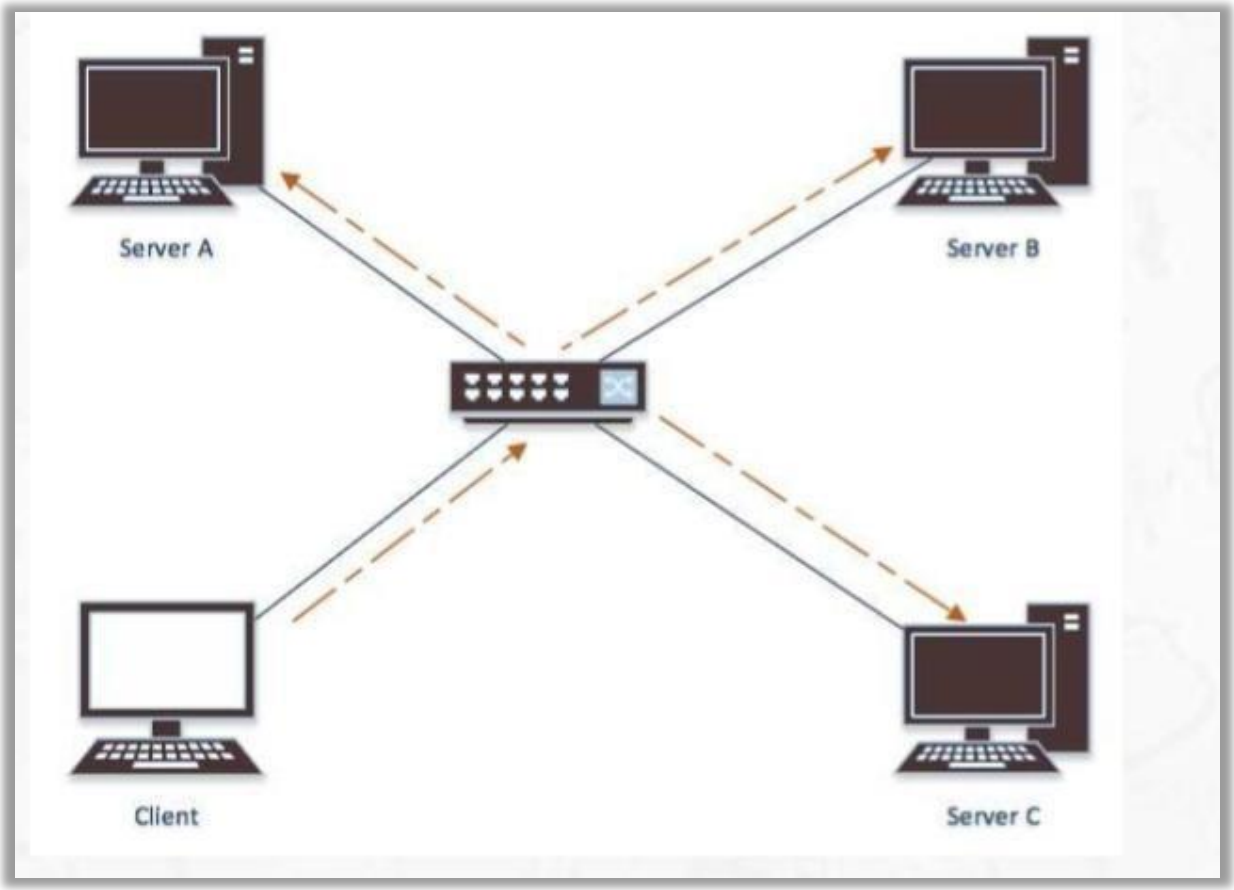
Class	Range	
	Lowest	Highest
A	0.0.0.0	127.255.255.255
B	128.0.0.0	191.255.255.255
C	192.0.0.0	223.255.255.255
D	224.0.0.0	239.255.255.255
E	240.0.0.0	255.255.255.254

• Purpose

The Internet Protocol is the protocol that defines and enables internetworking at the internet layer of the Internet Protocol Suite. In essence it forms the Internet. It uses a logical addressing system and performs *routing*, which is the forwarding of packets from a source host to the next router that is one hop closer to the intended destination host on another network.

IPv4 is a connectionless protocol, and operates on a best-effort delivery model, in that it does not guarantee delivery, nor does it assure proper sequencing or avoidance of duplicate delivery. These aspects, including data integrity, are addressed by an upper layer transport protocol, such as the Transmission Control Protocol (TCP).

An IPv4 address is **typically written in decimal digits, formatted as four 8-bit fields separated by periods**. Each 8-bit field represents a byte of the IPv4 address. This form of representing the bytes of an IPv4 address is often referred to as the dotted-decimal format.



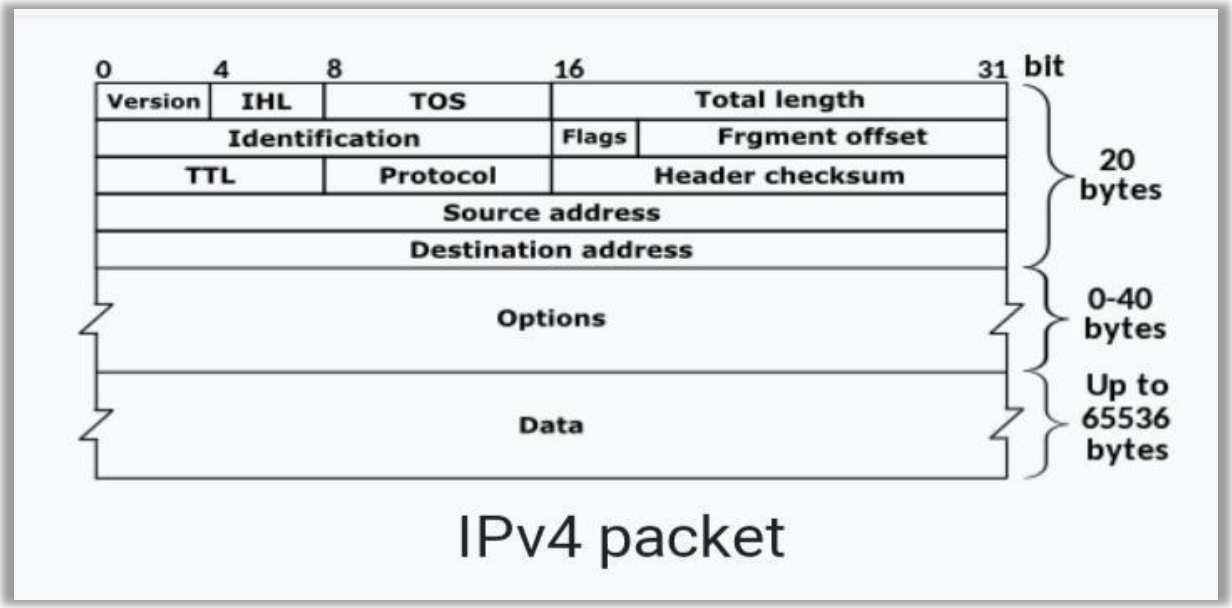
- **Packet Structure**

An IP packet consists of a header section and a data section. An IP packet has no data checksum or any other footer after the data section. Typically the link layer encapsulates IP packets in frames with a CRC footer that detects most errors, many transport-layer protocols carried by IP also have their own error checking.

- **Address resolution**

Hosts on the Internet are usually known by names, e.g., www.example.com, not primarily by their IP address, which is used for routing and network interface identification. The use of domain names requires translating, called *resolving*, them to addresses and vice versa. This is analogous to looking up a phone number in a phone book using the recipient's name.

The translation between addresses and domain names is performed by the Domain Name System (DNS), a hierarchical, distributed naming system that allows for the sub delegation of namespaces to other DNS servers.



Internet Protocol version 4 (**IPv4**) is the fourth version of the Internet Protocol (IP). It is one of the core protocols of standards-based internetworking methods in the Internet and other packet-switched networks. IPv4 was the first version deployed for production on SATNET in 1982 and on the ARPANET in January 1983. It is still used to route most Internet traffic today,[1] even with the ongoing deployment of Internet Protocol version 6 (IPv6),[2] its successor.

IPv4 uses a 32-bit address space which provides 4,294,967,296 (2^{32}) unique addresses, but large blocks are reserved for special networking purposes**.**

The Internet Protocol enables traffic between networks. The design accommodates networks of diverse physical nature; it is independent of the underlying transmission technology used in the link layer. Networks with different hardware usually vary not only in transmission speed, but also in the maximum transmission unit (MTU). When one network wants to transmit datagrams to a network with a smaller MTU, it may fragment its datagrams. In IPv4, this function was placed at the Internet Layer and is performed in IPv4 routers limiting exposure to these issues by hosts.

In contrast, IPv6, the next generation of the Internet Protocol, does not allow routers to perform fragmentation; hosts must perform Path MTU Discovery before sending datagrams.

• Assistive protocols

IP addresses are not tied in any permanent manner to networking hardware and, indeed, in modern operating systems, a network interface can have multiple IP addresses. In order to properly deliver an IP packet to the destination host on a link, hosts and routers need additional mechanisms to make an association between the hardware address[c] of network interfaces and IP addresses. The Address Resolution Protocol (ARP) performs this IPaddress-to-hardware-address translation for IPv4. In addition, the reverse correlation is often necessary. For example, unless an address is preconfigured by an administrator, when an IP host is booted or connected to a network it needs to determine its IP address. Protocols for such reverse correlations include Dynamic Host Configuration Protocol (DHCP), Bootstrap Protocol (BOOTP) and, infrequently, reverse ARP.

• What is IPv4 protocol in networking

Internet Protocol version 4 (IPv4) is **the fourth version of the standard that routes Internet traffic and other packet-switched networks** introduced in 1982 by the Internet Engineering Task Force (IETF). IPv4 is the most widely used version of the protocol despite the limitations of its 32-bit address space.

• Three forms of IPv4 Communication

Unicast, Broadcast, Multicast- Types of communication

In an IPv4 network, the hosts can communicate one of three different ways: Unicast - the process of sending a packet from one host to an individual host. Broadcast - the process of sending a packet from one host to all hosts in the network

There are four different types of IP addresses: **public, private, static, and dynamic**.

- **ipv4 packet Structure**

In TCP/IPv4 packets, there is **a TCP (or UDP) packet header, then an IPv4 packet header, then the packet data**. Each header is a structured collection of data, including things such as the IPv4 source address (who sent the packet), and the IPv4 destination address. **IPv4 can also be made more secure** so there is essentially no difference between them when it comes to Internet Protocol security. The IPv4 will identify the network and the individual host on the network.

• Advantage and Disadvantages of ipv4

Advantages of IPV4:

- IPV4 is necessary to encrypt data to ensure privacy. It takes security measures to encrypt data in its address packets.
- IPV6 protocol can be easily supported by most of the topology drawings.
- Since addresses are combined more effectively the process of routing has become more efficient in IPV4.
- Both devices can easily handle IPV4 routing, which is part of the IPV4 protocol. As a consequence, practically every major device will accept the IPV4 protocol.
- IPV4 does to great lengths to ensure that data packets arrive at their destination. This is because the transmission control protocol employs IPV4 variants.
- IPV4's main aim is to connect various types of devices to one another.

Disadvantages of IPV4:

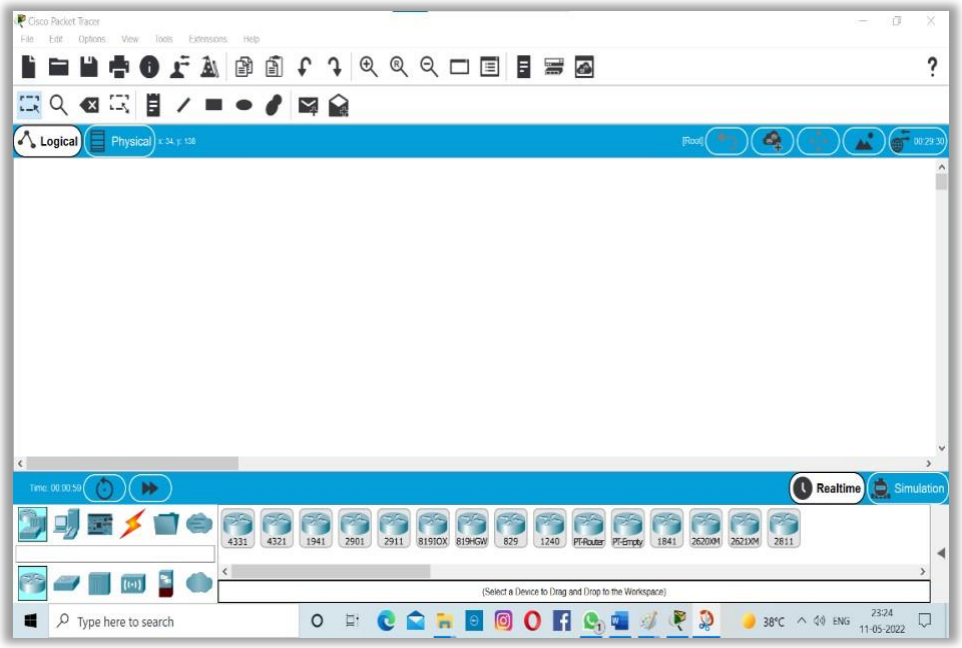
- By defining the use of the internet, IPsec provides network protection to IPV4.

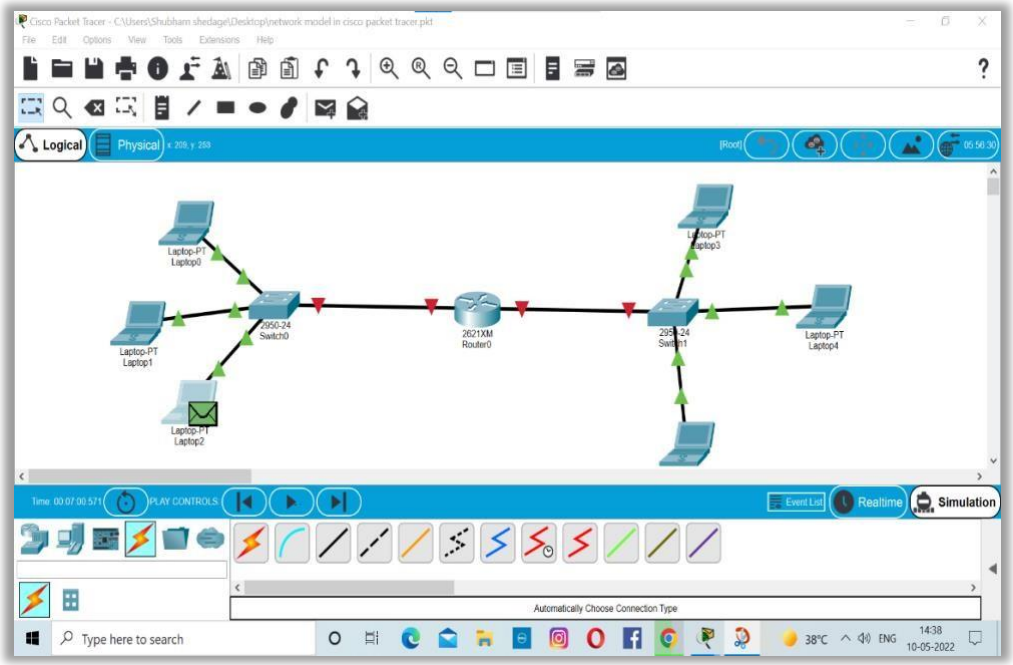
However, the issue arises when IPSec is not built-in and its use is optional.

- IPV4 needs either manual or automatic configuration. DHCP is difficult because its infrastructure needs different management.
- Despite the fact that IPV4 has a mobility specification, it is considered inefficient. This is due to the fact that it operates on its own infrastructure. Its mobility nodes are also unsuccessful.
- Individual IPV4 address prefixes are allocated to each router so that it can operate independently. Today's Internet uses both flat and hierarchical routers. On the internet, there are over 85000 roads.

- **How To Create ipv4 based Simulation using Cisco Packet Tracker Simulator**

1. Step 1: Launch Packet Tracer. a. ...
2. Step 2: Build the topology. a. ...
3. Step 1: Configure the wireless router. a. ...
4. Step 2: Configure the laptop. a. ...
5. Step 3: Configure the PC. a. ...
6. Step 4: Configure the Internet cloud. a. ...
7. Step 5: Configure the Cisco.com server. a. ...
8. Step 1: Refresh the IPv4 settings on the PC


Cisco Packet Tracer
Logical
Physical
Realtime
Simulation
(Select a Device to Drag and Drop to the Workspace)
Type here to search


Logical
Physical
Laptop-PT Laptop0
Laptop-PT Laptop1
Laptop-PT Laptop2
2950-24 Switch0
2621XM Router0
Laptop-PT Laptop3
Laptop-PT Laptop4
Realtime
Simulation
Automatically Choose Connection Type
Type here to search