Lab 4 : SUPERNETTING AND SUBNETTING

OBJECTIVES :

- To develop a thorough understanding of the principles of subnetting and supernetting through theoretical study.
- To execute these addressing techniques practically by configuring network topologies within the Cisco Packet Tracer environment.

THEORY:

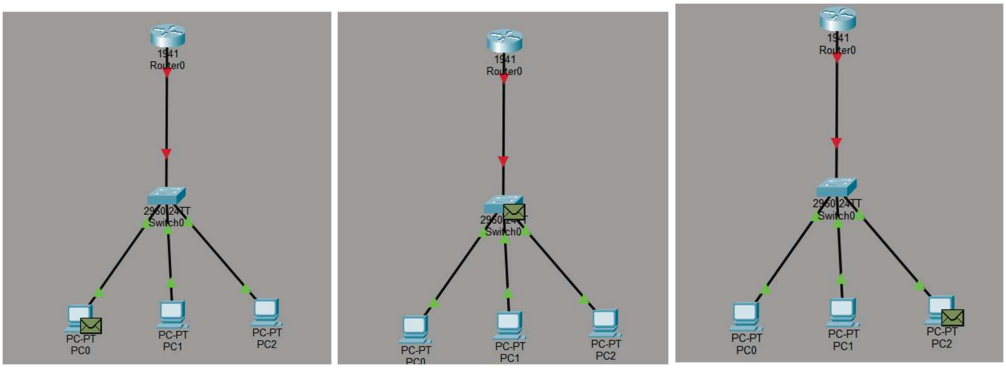
Cisco Packet Tracer is an interactive network design and simulation application that allows users to create and analyze network topologies without using real networking equipment. It is based on packet-level simulation, enabling virtual routers, switches, and end devices to be placed and configured within a simulated environment. The tool supports two working modes: **Real-Time Mode**, where network devices react instantly to configuration changes, and **Simulation Mode**, which allows users to pause the network operation and closely examine the flow of individual packets across different OSI layers. By emulating the functionality of Cisco IOS (Internetwork Operating System), Packet Tracer effectively links theoretical networking knowledge with practical, real-world network configuration skills.

Supernetting:

Supernetting, also referred to as route summarization, is a networking technique used to merge multiple adjacent networks into a single larger network by applying a shorter subnet mask. It is essentially the opposite of subnetting and is commonly implemented in routers to simplify routing tables. By reducing the number of routing entries, supernetting improves routing efficiency while minimizing memory usage and processing overhead.

Subnetting:

Subnetting is the process of dividing a single large physical network into several smaller, logical sub- networks (subnets). This is achieved by "borrowing" bits from the host portion of an IP address and adding them to the network portion. The primary goal is to improve network security, manage traffic more efficiently by reducing broadcast domains, and prevent the wasting of IP addresses within an organization.



Vis.	Time(sec)	Last Device
	0.000	--
	0.001	PC0
	0.002	Switch0
	0.003	PC2
	0.004	Switch0

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	PC0	PC2	ICMP		0.000	N	0

Device	IPV4	Subnet Mask	Default Gateway
PC-PT PC0	192.168.1.10	255.255.252.0	192.168.1.1
PC-PT PC1	192.168.2.10	255.255.252.0	192.168.1.1
PC-PT PC2	192.168.3.10	255.255.252.0	192.168.1.1

1. Subnetting :

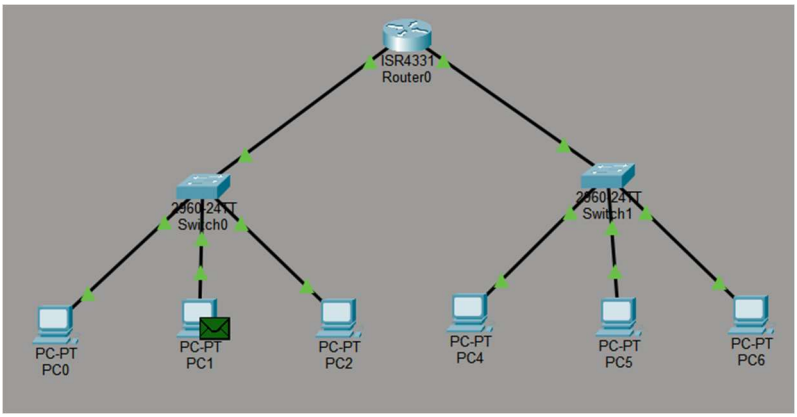
Base network : 192.168.1.0/24

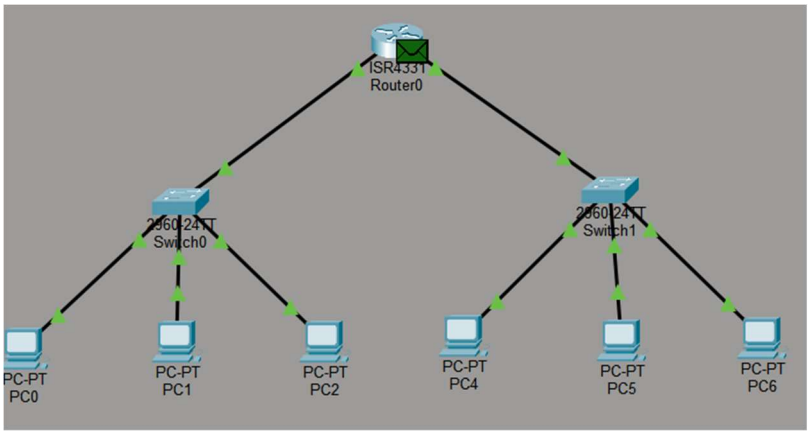
Required number of subnets :

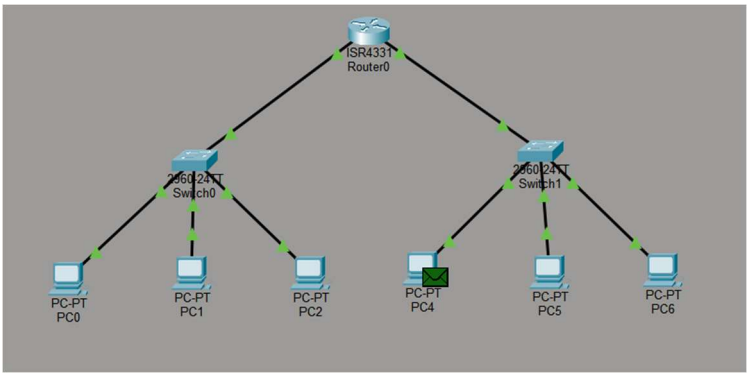
4 No. of IP addresses per

subnet : 64

Subnet	Network Address	Broadcast Address	First usable IP	Last usable IP
00	192.168.1.0	192.168.1.63	192.168.1.1	192.168.1.62
01	192.168.1.64	192.168.1.127	192.168.1.65	192.168.1.126
10	192.168.1.128	192.168.1.191	192.168.1.129	192.168.1.190
11	192.168.1.192	192.168.1.255	192.168.1.193	192.168.1.254







Event List

Vis.	Time(sec)	Last Device
	0.000	--
	0.001	PC1
	0.002	Switch0
	0.003	Router0
	0.004	Switch1
	0.005	PC4
	0.006	Switch1
	0.007	Router0
	0.008	Switch0
	1.980	--

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	De
	Successful	PC1	PC4	ICMP		0.000	N	0	(edit)	

DISCUSSION AND CONCLUSION:

During the simulation, we examined how subnetting structures internal networks by dividing users into well-defined and secure logical groups. This approach improves network security and limits broadcast traffic, ensuring that local data does not overload the entire network. In contrast, the simulation showed that supernetting plays a vital role in large-scale routing by combining multiple network addresses into a single summarized route. This significantly reduces routing table size, enabling routers to forward packets more efficiently across wide networks.

In conclusion, this experiment effectively illustrated the management of IP address space to enhance overall network performance. The results confirmed that subnetting helps in controlling and isolating network traffic, while supernetting streamlines routing by reducing complexity.

Implementing these techniques in Cisco Packet Tracer provided valuable hands-on experience in designing efficient, scalable, and well-organized network architectures.