



USMAN INSTITUTE OF TECHNOLOGY

Affiliated with NED University of Engineering & Technology, Karachi

BACHELOR OF SCIENCE (COMPUTER SCIENCE/SOFTWARE ENGINEERING)

CS222 DATA COMMUNICATION & COMPUTER NETWORKS

PROJECT REPORT

Hospital Network Design

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ABSTRACT :

This report details the network design for a healthcare management system or hospital. The network topology includes nodes such as computers, switches, routers, and other devices connected to a local area network (LAN) and network via links, such as twisted pair copper wire cable or optical fiber cable. The design was created using Cisco Packet Tracer and is a general framework that can be implemented at any higher level for managing network systems.

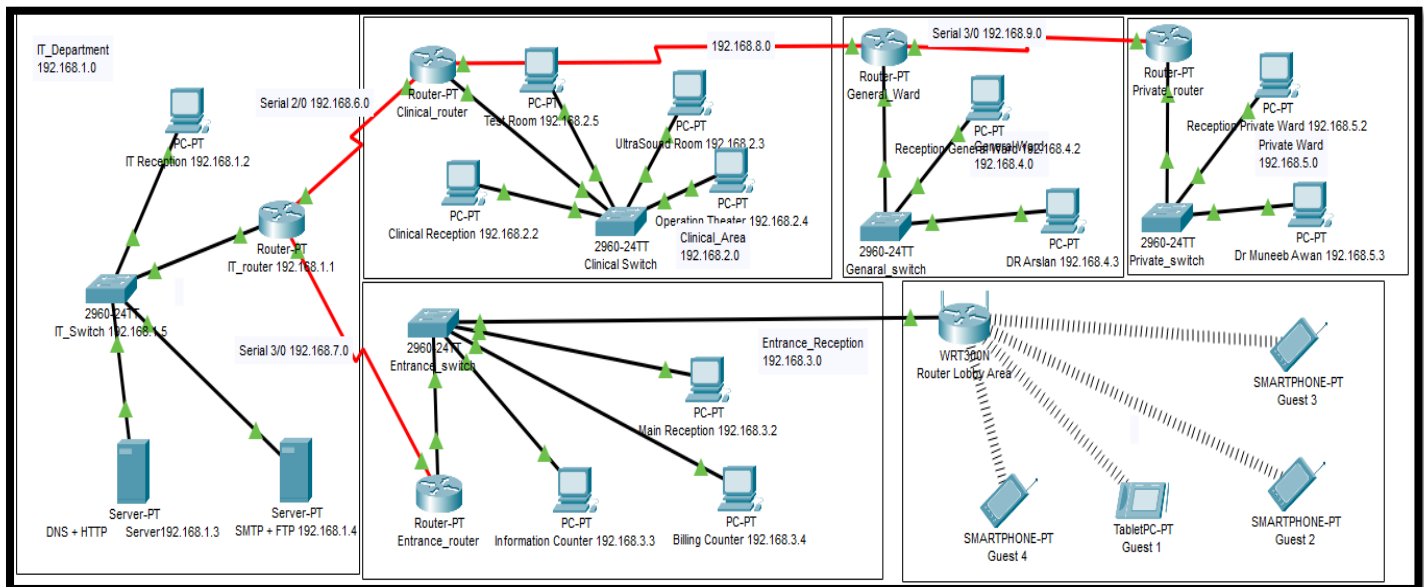
INTRODUCTION:

The network design for healthcare or hospital environments connects many devices in a local network, making sure they can communicate and share information easily. This project is created on a Cisco packet tracer. In this project, we show the intercommunication between departments (the general ward, private ward, clinical area, IT department, entrance reception, and lobby). We use VLAN 10 throughout the system. We set up and configure the essential network services through DHCP, DNS, HTTPS, SSH, SMTP, FTP, and WIFI where we use SSH to secure communication and access control within the network and WIFI to provide wireless connection to the lobby area. This project provides flexible and scalable solution, focusing on security, reliability, and high performance. It includes advanced features like Quality of Service, redundant paths, and strong security measures to protect patient information and follow privacy rules. This design also allows for future growth and integration of new technologies, ensuring that the network can adapt to the changing needs of the healthcare industry.

FEATURES:

- Following features are being used in this project ;
 - DHCP** - is a network management protocol used on UDP/IP networks that assigns an IP address and other network configuration parameters to each device on a network so they can communicate with other IP networks.
 - DNS** - The Domain Name System is a hierarchical and decentralized naming system for computers, services, or other resources connected to the Internet or a private network.
 - Subnetting** - A subnetwork or subnet is a logical subdivision of an IP network. The practice of dividing a network into two or more networks is called subnetting.
- **HTTPS** - It is used for secure communication over a computer network and is widely used on the Internet.
- **SSH** - Secure Shell is a cryptographic network protocol for operating network services securely over an unsecured network.
- **SMTP** – It is a communication protocol for electronic mail transmission.
- **FTP** – It is a standard network protocol used for the transfer of computer files between a client and server on a computer network.
- **WIFI** - Wi-Fi is the name of a wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections.

NETWORK DESIGN:

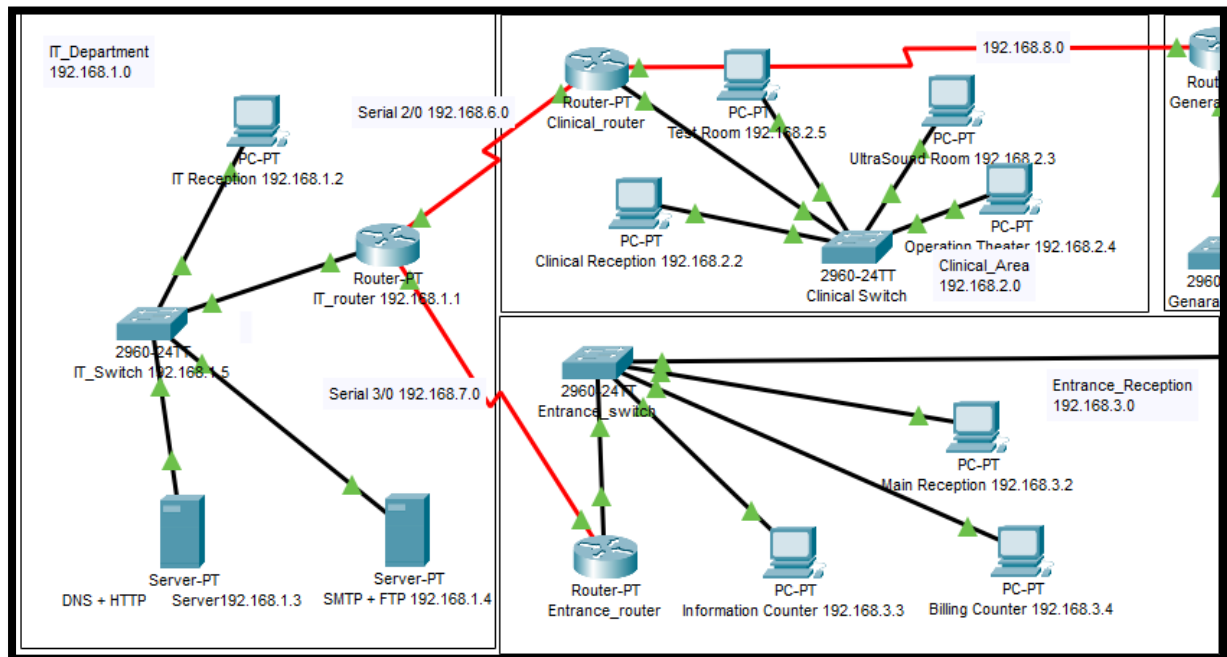


In this project, a network has been established to facilitate data exchange between desktops, laptops, and smartphones. The network encompasses various designated areas, including the general ward, private ward, clinical area, IT department, entrance reception and lobby, parking, and cafeteria. To ensure security, SSH (Secure Shell) has been implemented within the network infrastructure. This involves the use of network equipment such as switches, routers, and servers to support the seamless and secure transfer of data between the different devices and areas within the system.

IMPLEMENTATION:

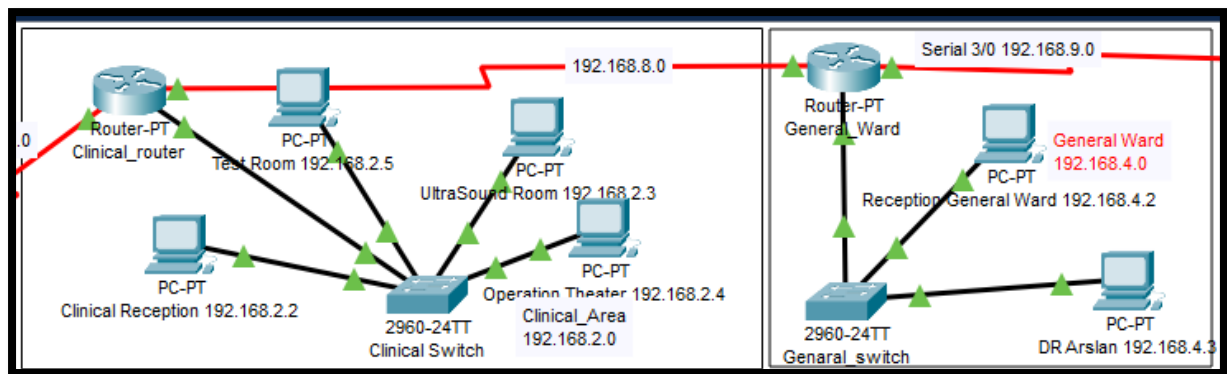
- ❖ Selecting the appropriate cabling infrastructure, such as twisted pair copper wire or optical fiber cable.
- ❖ Procuring the necessary network devices such as routers, switches, servers, desktop computers, laptops, and smartphones to meet the network requirements.
- ❖ Configuring the network devices to reflect the segmented layout of the hospital, ensuring that each department (General ward, Private ward, Clinical Area, IT Department, Entrance Reception, Lobby, Parking, Cafeteria) is properly represented and secured.
- ❖ Assigning IP addresses to each interface of the hosts and routers as per the defined segments, ensuring that the ranges for each segment are correctly allocated and clearly labelled.
- ❖ Setting up and configuring the essential network services, including DHCP, DNS, HTTPS, SSH, SMTP, FTP, and WIFI, to enable seamless data flow, secure communication, and efficient resource sharing within the hospital network.
- ❖ Ensuring the implementation of SSH for secure communication and access control within the network, along with any additional security measures deemed necessary for safeguarding sensitive healthcare data.
- ❖ Then moving on testing and validation.

SIMULATION & TESTING



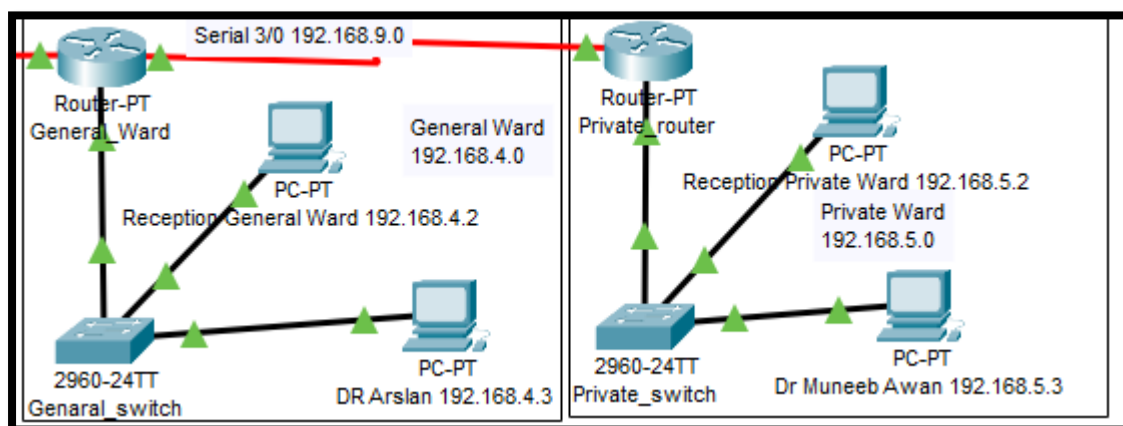
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	IT Re...	Main Rece...	ICMP		0.000	N	0	(edit)

IT Department(IT reception) communicates Entrance reception(Main reception)



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	De
	Successful	Test ...	Reception ...	ICMP		0.000	N	0	(edit)	(d)

Inter communication between Clinical area(Test Room) and General ward(Reception)



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	De
	Successful	DR Ar...	Dr Muneeb...	ICMP		0.000	N	0	(edit)	(d)

Communication between General ward(Dr Arslan) and Private ward(Dr Muneeb)

CONCLUSION:

To sum up, this report describes how we carefully designed a strong network topology for hospital-based healthcare management. By using VLSM for subnetting and segmenting the network into five different segments, our flexible and scalable network design can meet the diverse requirements of elite hospitals and healthcare facilities. This methodology establishes the foundation for smooth data transfer, improved operational effectiveness, and the incorporation of medical technologies to facilitate superior patient care and administration.