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ABSTRACT

This report describes the network design of Health care management or Hospital. In this network topology the nodes (i.e., computers, switches, routers or other devices) are connected to a local area network (LAN) and network via links (twisted pair copper wire cable or optical fiber cable). We have used Cisco Packet Tracer for designing the network topology It's a general design which can be implemented at any higher level to manage network system.

The network design is a major part of the infrastructure of a hospital. Internet speed is a major component of ensuring that healthcare providers and other professionals achieve timely access to pertinent information. The main aim of this paper is to design a hospital network which meets the requirements of a hospital network like electronic health records, on-call doctors via video communication, billing department records, keeping track of the research in progress, etc. The aim is to provide secured LAN and WLAN network. The network is designed by keeping in mind of upcoming technology in medical field. This will increase the quality of hospital service along with patient safety and clinical effectiveness.

INTRODUCTION

The field of Information Technology and Network Infrastructure Management has become a crucial component inside the healthcare industry. Medical experts are working along with the IT departments to create more medical devices that can be

connected to the network, hence providing doctors the facility to monitor patients easily over internet. Also, hospitals have initiated the method of electronic health records which are easy to access for doctors as well as the patient's family members. There are several times when a doctor can't be present and this factor has already been overcome by video communication. The hospital network has to be made secure as well so that essential data like medical records and research work does not fall into the wrong hands.

In general, in designing and maintaining the performance, efficiency, architecture and security of the hospital network, the IT manager faces a lot of challenges. An important consideration of network design for today's networks is creating the potential to reliably, scalable and securely support future expansion.

We need to design a network topology that is easy to understand, easy to manage, easy to troubleshoot and is adaptable to change in future according to the new medical equipment's. Among the various topologies like bus topology, ring topology, mesh topology, star topology, etc, Hierarchical topology would best meet our demands. The hierarchical network design model serves to help us develop a network topology in separate layers. Each layer focuses on specific functions, enabling us to choose the right equipment and features for the layer. A hierarchical design avoids the need for a fully meshed network in which all network nodes are interconnected and thus making it simple and easy to understand.

NETWORK REQUIREMENTS

In Health care Network topology, we have desktop Computer, laptops, smart phone. There is a data flow between the devices within the system. We have divided our network into segments like for Hospital wards, clinical area etc. We have also used SSH for security. Our network requirements include network devices like routers, switches, server.

KEYWORDS

LAN, WLAN, Hub, Switch, Router.

OBJECTIVES

The primary objective of this research paper is to provide state of the art networking facilities for the IP-based medical devices, doctors, nurses, visitors and working staff of the hospital. Given below the points to throw light on the subject matter:

- Providing remote medical consultancy or to supervise the surgery/operation from remote location.
- Uninterrupted high-speed internet connectivity.
- Provide better medical facilities to the patients.

- Organized health records for future use.
- Uninterrupted communication between different departments of the hospital.
- Reducing the workload at nurse station, account department, reception desk.
- Keeping the research work of the doctors and medical records of patients secure.
- Providing limited internet access for the visitors.

HOSPITAL SEGMENTS

1 General ward

2 Private ward

3 Clinical Area

4 IT Department

5 Entrance Reception

6 Lobby and Parking

FEATURES AND SERVICES

- DHCP
- DNS
- Subnetting
- HTTPS
- SSH
- SMTP
- FTP
- WIFI

COST OF NETWORK

- Cisco Switch

250$ Each

1250$ Cost of 5 Switch

- Cisco Router

350$ Each

2100$ Cost of 6 Router

- Cisco Server

400$ Each

800$ Cost of 2 Server

- Computer Cost

125$ Each

1500$ Cost of 12 Computer

Total Cost = 5650$

CONFIGURATION

The diagram is properly commented. We have divided the diagram into 6 segments as named above. Hospital Segments representing different departments of hospital. Following are the running configuration of routers and switches related to different segments of hospital respectively:

General Ward Switch	General Ward Router

Private Ward Switch	Private Ward Router

Clinical Area Switch	Clinical Area Router

IT Department Switch	IT Department Router

Entrance Switch	Entrance Router

DEFINITIONS

- DHCP

The Dynamic Host Configuration Protocol (DHCP) is a network management protocol used on UDP/IP networks whereby a DHCP server dynamically 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

Hypertext Transfer Protocol Secure is an extension of the Hypertext Transfer Protocol. It is used for secure communication over a computer network and is widely used on the Internet. Hypertext Transfer Protocol Secure is an extension of the Hypertext Transfer Protocol. 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

The Simple Mail Transfer Protocol is a communication protocol for electronic mail transmission.

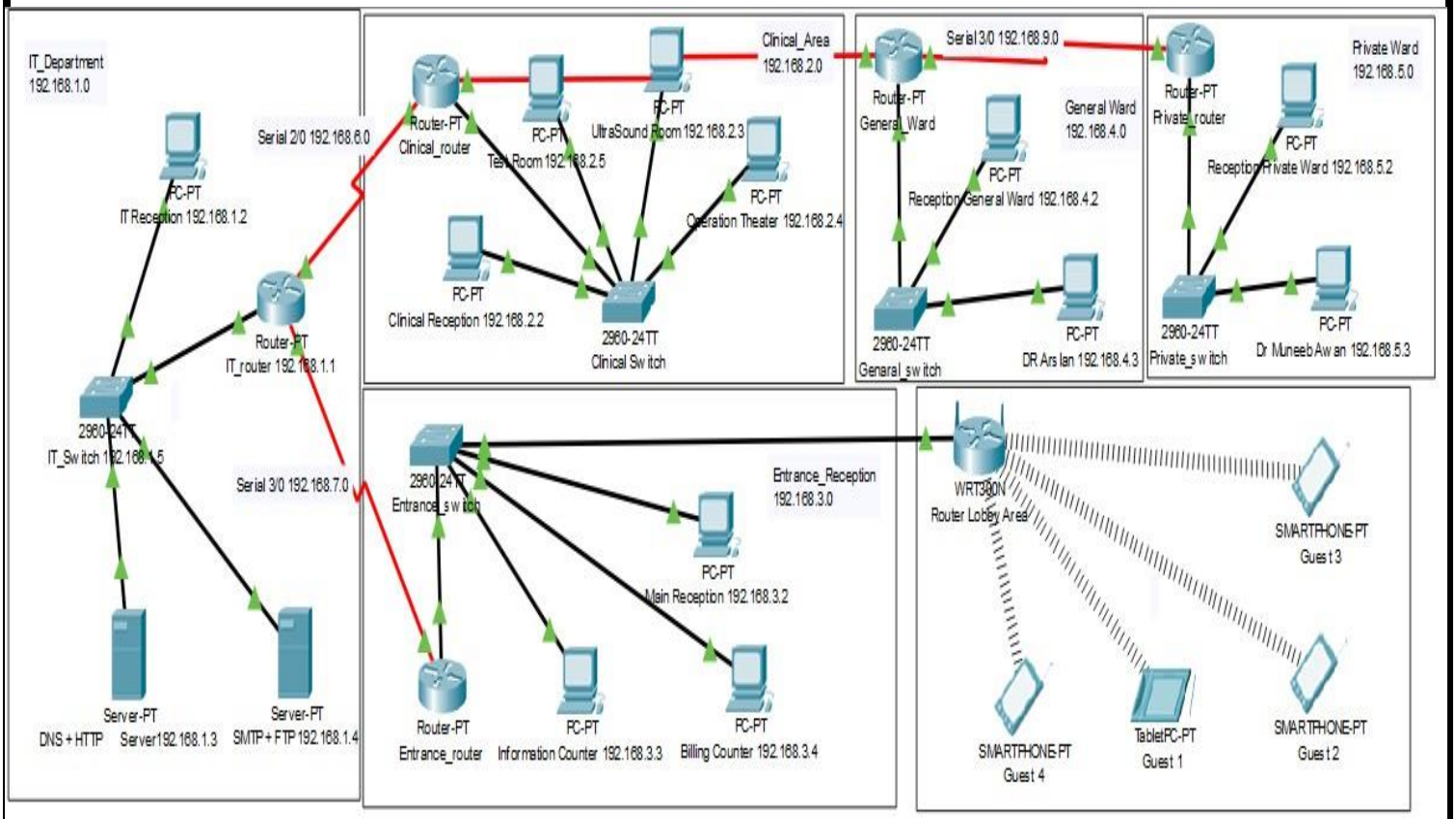
- FTP

The File Transfer Protocol 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 DIAGRAM



CONCLUSION

This report describes how we have designed network topology of hospital (Health care Management System). With VLSM for Subnetting, segmented the diagram into 5 segments. This topology can also be implemented on higher level of hospitals.

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