



Computer Network Project Healthcare Network

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Under the guidance
of
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CANDIDATE's DECLARATION

We hereby declare that the mini project work being presented in this report entitled “**HEALTHCARE NETWORK SYSTEM**” submitted in the Department of Computer Application, FACULTY OF TECHNOLOGY, *Doon Business School, Dehradun* is the authentic work carried out under the guidance of **ASST. PROF. SAURABH SINGH**, Professor, Department of computer application, *Doon business school, Dehradun*.

Date: 15/12/2023

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ACKNOWLEDGEMENT

We would like to express my special thanks of gratitude to my teacher **ASST. PROF. SAURABH SINGH** gave us the golden opportunity to do this wonderful project “**HEALTHCARE NETWORK SYSTEM**” which also helped us do a lot of research and we came to know about so many new things. We are thankful to them.

Date: 15/12/2023

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SYNOPSIS

TITLE OF THE PROJECT:

Overview

The Human Body is a very complex and sophisticated structure and comprises millions of functions. All these complicated functions have been understood by man, part by part their research and experiments. As science and technology progressed, medicine became an integral part of the research. Gradually, medical science became an entirely new branch of science. As of today, the Health Sector comprises medical institutions i.e. Hospitals, HOSPITALs etc. research and development institutions, and medical colleges. Thus, the Health sector aims at providing the best medical facilities to the common man.

Abstract

A Hospital Network System provides the benefits of streamlined operations, enhanced administration, control, superior patient care, strict cost control, and improved profitability. HMS is powerful, flexible, and easy to use and is designed and developed to deliver really conceivable benefits to hospitals. More importantly, it is backed by reliable support. The project 'Hospital Network System' is based on database, object-oriented, and networking techniques. The Hospital Network System is custom-built to meet the specific requirement of mid and large-size hospitals across the globe. All the required modules and features have been particularly built to just fit into your requirements. This package has been widely accepted by clients in India and overseas. Not only this but they are highly satisfied and appreciating. The entire application is web-based and built on 3 tier architecture using the latest technologies. The sound database of the application makes it more user-friendly and expandable. The package is highly customizable and can be modified as per the needs and requirements of our clients. A prolonged study of the functionalities of the hospital and its specific requirement has given it a wonderful shape both technically and usability-wise. It covers all the required modules right from pharmacy, reception, doctors, finance, staff, etc. The Human Body is a very complex and sophisticated structure and comprises millions of functions. All these complicated functions have been understood by man, part by part their research and experiments. As science and technology progressed, medicine became an integral part of the research. Gradually, medical science became an entirely new branch of science. As of today, the Health Sector comprises medical institutions i.e. Hospitals, HOSPITALs etc. research and development institutions, and medical colleges. Thus, the Health sector aims at providing the best medical facilities to the common man.

Problem Statement Since Hospital is associated with the lives of common people and their day-to-day routines I decided to work on this project. The manual handling of the record is time-consuming and highly prone to error. The purpose of this project is to automate or make

online, the process of day-to-day activities like Room activities; Admission of New Patients, Discharge of Patients, Assigning a doctor, and finally computing the bill, etc. I have tried my best to make the complicated process Hospital Network System as simple as possible using the Structured Modular technique-oriented interface. I have tried to design the software in such a way that users may not have any difficulty using this package. Further expansion is possible without much effort. Even though I cannot claim that this work is entirely exhaustive, the main purpose of my exercise is to perform each Hospital's activity in a computerized way rather than manually, which is time-consuming. I am confident that this software package can be readily used by non-programming personnel avoiding human-handled chances of error.

Project objectives

Hospitals are an essential part of our lives, providing the best medical facilities to people suffering from various ailments, which may be due to changes in climatic conditions, increased workload, emotional trauma stress, etc. The hospitals must keep track of the day-to-day activities & records of its patients, doctors, nurses, ward boys, and other staff personnel that keep the hospital running smoothly & successfully.

However, keeping track of all the activities and their records on paper is very cumbersome and error prone. It also is a very inefficient and time-consuming process. Observing the continuous increase in population and number of people visiting the hospital. Recording and maintaining all these records is highly unreliable, inefficient, and error prone. It is also not economically & technically feasible to maintain these records on paper. Thus, keeping the working of the manual system as the basis of our project. We have developed an automated version of the manual system, named “Administration Support System for Medical Institutions.

The main aim of our project is to provide a paperless hospital of up to 90%. It also aims at providing low-cost reliable automation of the existing systems. The system also provides excellent security of data at every level of user-system interaction and provides robust & reliable storage and backup facilities.

Software development life cycle

- SDLC stands for" *Software development life cycle*".
- SDLC is a collection of processes that are followed to develop software.
- It covers the detailed building plan, deploying and maintaining the software.
- The main of SDLC is to define all the tasks for developing and maintaining software.
- It is followed for a software project within a software-developing organization.

Phases of SDLC

- PHASE-1-Feasibility study
- PHASE-2- Requirement gathering & analysis
- PHASE-3-Design
- PHASE-4- Coding
- PHASE-5- Testing
- PHASE-6- Deployment
- PHASE-7-Maintenance

PHASE-1- FEASIBILITY STUDY

- In this organization discuss the cost and benefits of the software.
- It measures how much beneficial the product is for the organization.

TYPES OF FEASIBILITY

1. Technical feasibility:

In this, we check whether we have the required technical resources.

2. Economic feasibility:

The cost and benefits of the project are analyzed.

3. Legal feasibility:

we investigate whether the project is legal or not.

4. Operational feasibility:

we examine whether the project satisfies the requirements identified in the requirement analysis phase.

5. Scheduling feasibility:

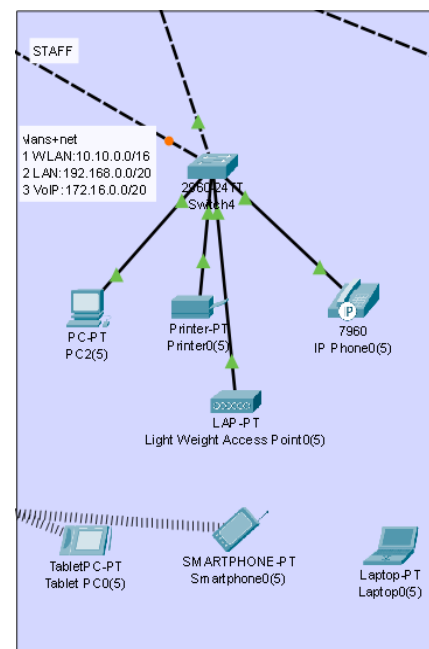
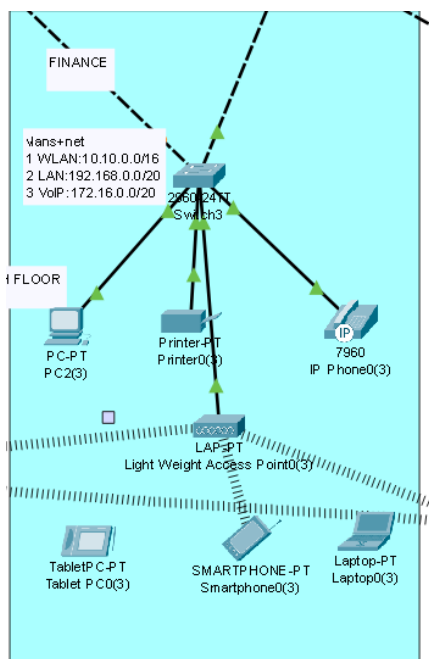
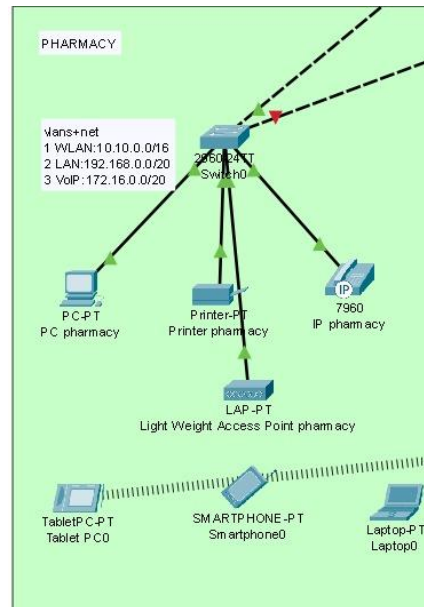
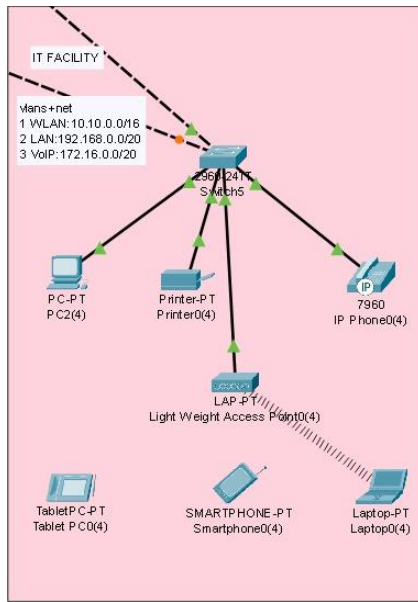
In this, we estimate the time necessary to complete the project.

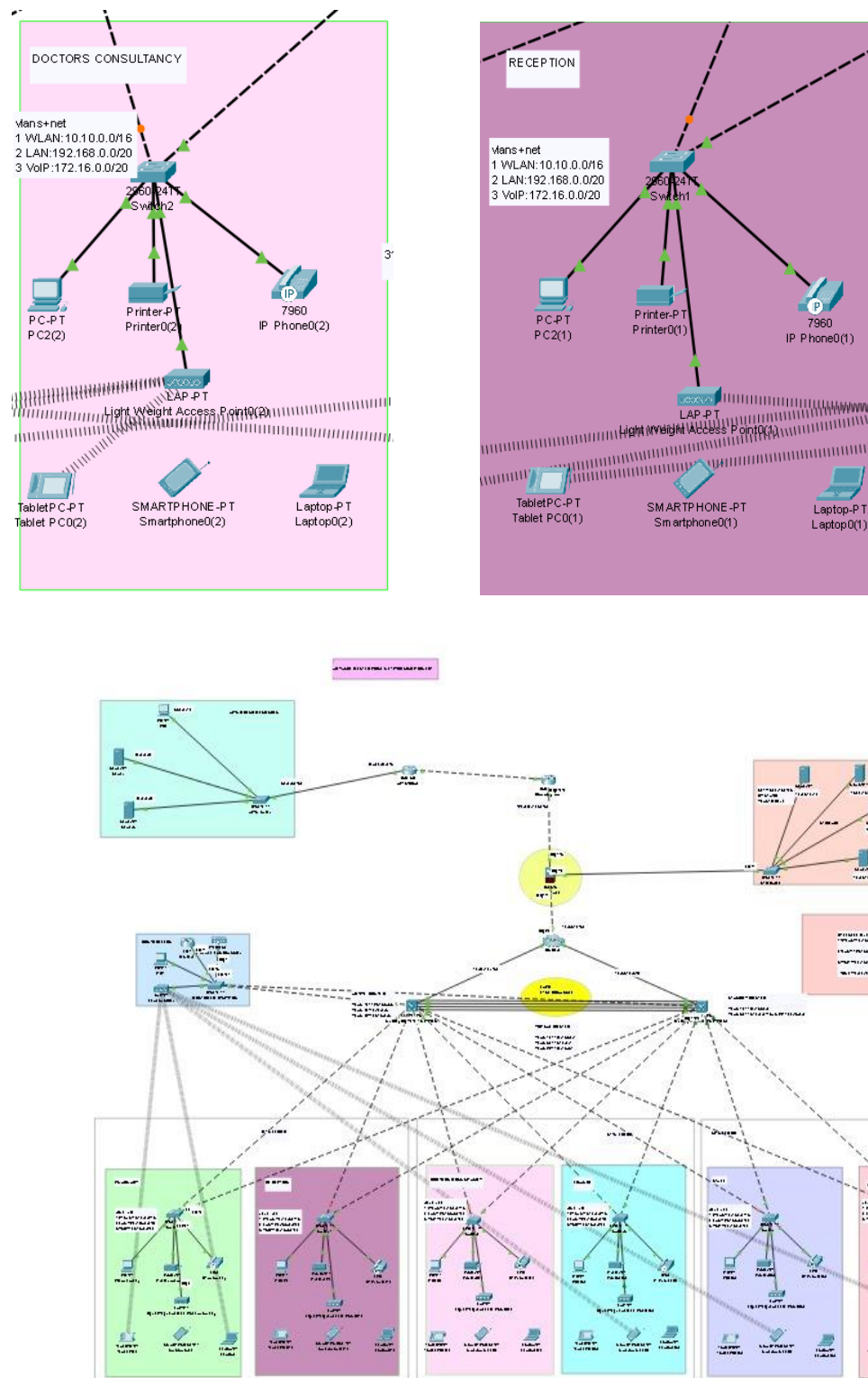
PHASE-2- REQUIREMENT GATHERING & ANALYSIS

- In this all the necessary information is collected from the customer to develop software as per their expectations
- Some important questions like- what is the need for software, who will be the end user, and what is the future scope?

PHASE-3-DESIGN

- It includes the design of everything that has to be coded.
- In this process SRS (system requirement specification) document is created which has all the information like- the language to be used, and database types.





PHASE-4-CODING

- Several developers code modules and then all modules are arranged together to work efficiently.

- **Command on Routers and Switch to Secure**

```
en  
conf t
```

```
hostname AWS-switch
```

```
banner motd *UNAUTHORISED ACCESS IS NOT ALLOWED!!!!*
```

```
enable password cisco
```

```
line console 0  
password cisco  
login  
exit
```

```
no ip domain-lookup  
service password-encryption
```

```
ip domain-name dbs.com  
username cisco password cisco
```

```
crypto key generate rsa general-keys modulus 1024  
ip ssh version 2  
do wr
```

- **Command on multilayer switch for vlans**

```
vlan 10  
name LAN  
vlan 50  
name WLAN  
vlan 99  
name VOICE
```

```
int range fa0/1-3  
switchport mode trunk
```

exit

```
int range fa0/4-20
switchport mode access
switchport access vlan 10
switchport voice vlan 99
exit
```

```
int range fa0/21-24
switchport mode access
switchport access vlan 50
exit
```

```
int range fa0/4-24
spanning-tree portfast
spanning-tree bpduguard enable
exit
do wr
```

- **Command on multilayer switch for vlan's address and helper's**
core 1 set up vlan's

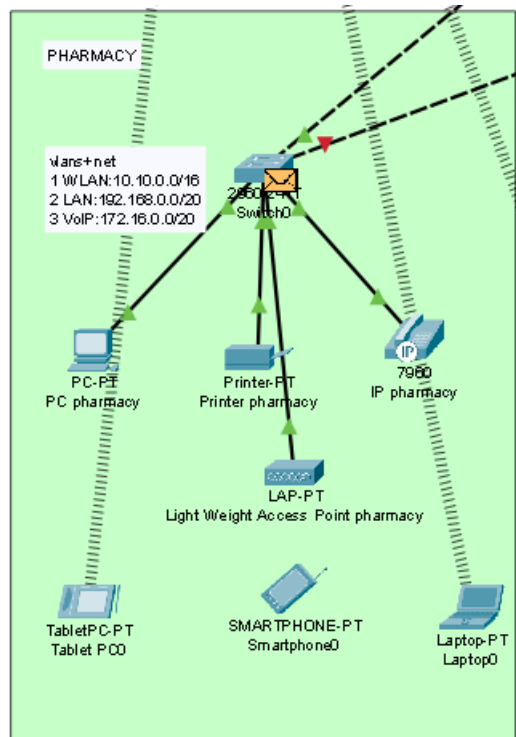
```
int vlan 10
ip add 192.168.0.3
ip helper-address 10.20.10.10
standby 10 ip 192.168.0.1
```

```
for vlan 50
ip 10.10.0.3 255.255.0.0
ip helper-address 10.20.10.10
standby 50 ip 10.10.0.1
```

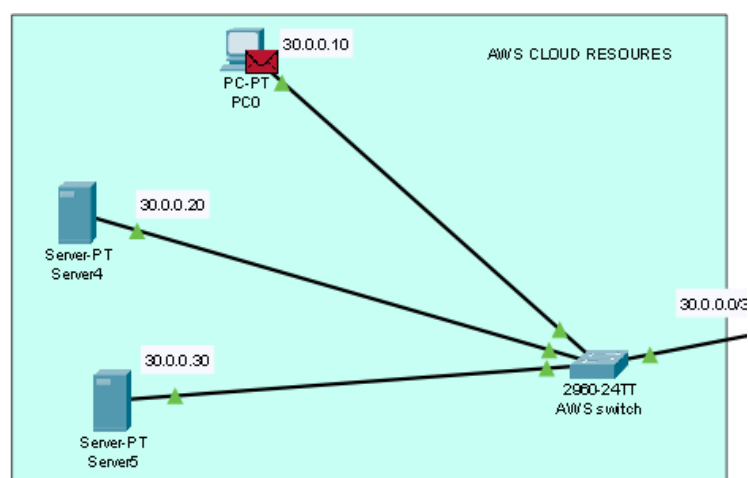
```
for vln 99
ip 172.16.0.3 255.255.240.0
ip helper-address 10.20.10.10
standby 99 ip 172.16.0.1
```



PHASE-5- TESTING

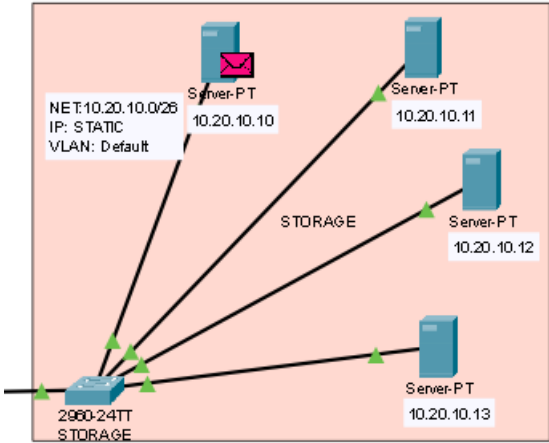
- In this software is tested for bugs and errors.





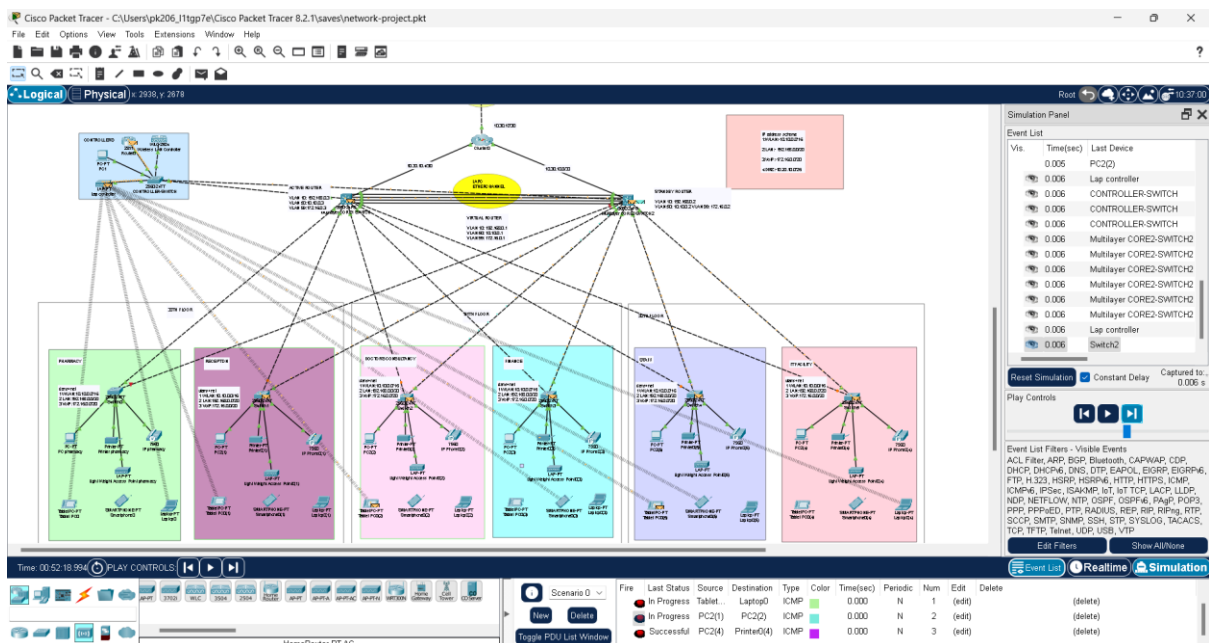
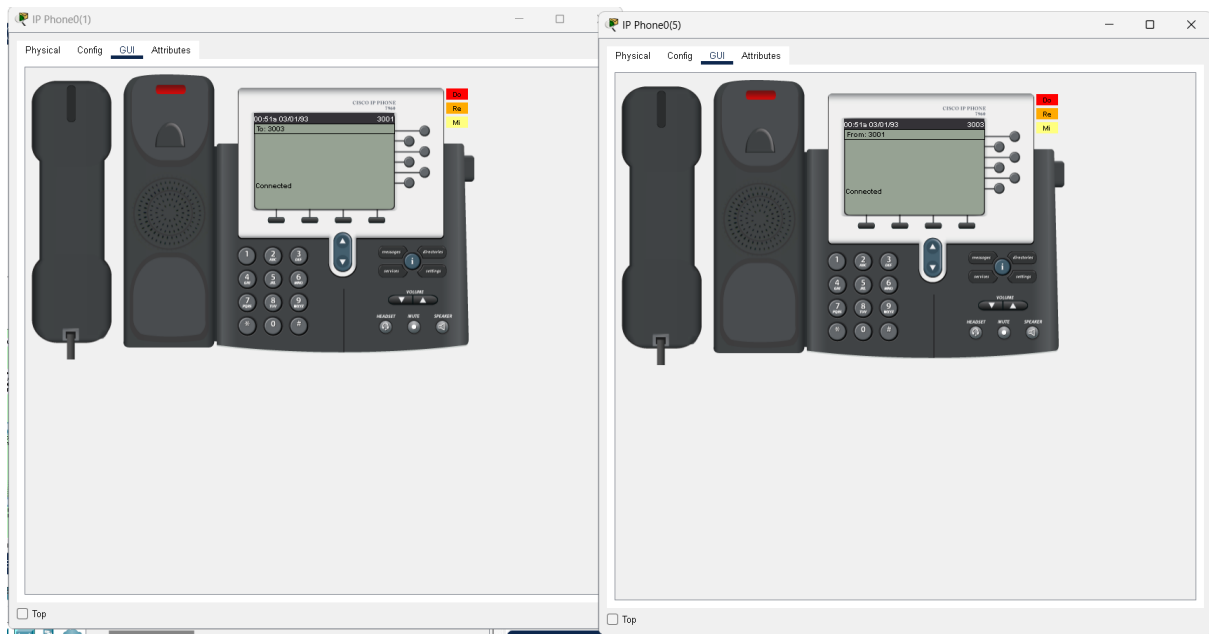
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Tablet...	Laptop0	ICMP		0.000	N	0	(edit)	(delete)



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Server4	ICMP		0.000	N	0	(edit)	(delete)

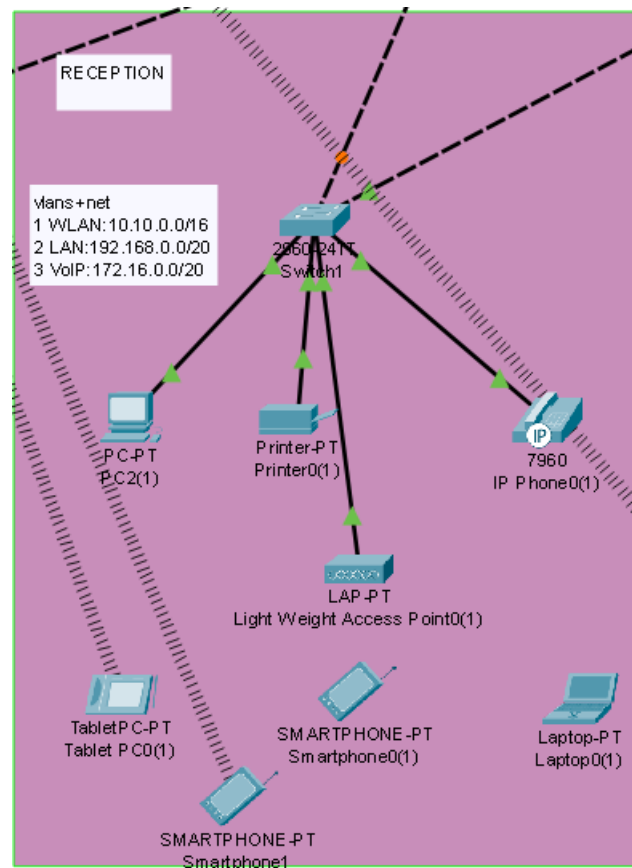


Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Server0	Server3	ICMP		0.000	N	0	(edit)	(delete)



PHASE-7- MAINTENANCE

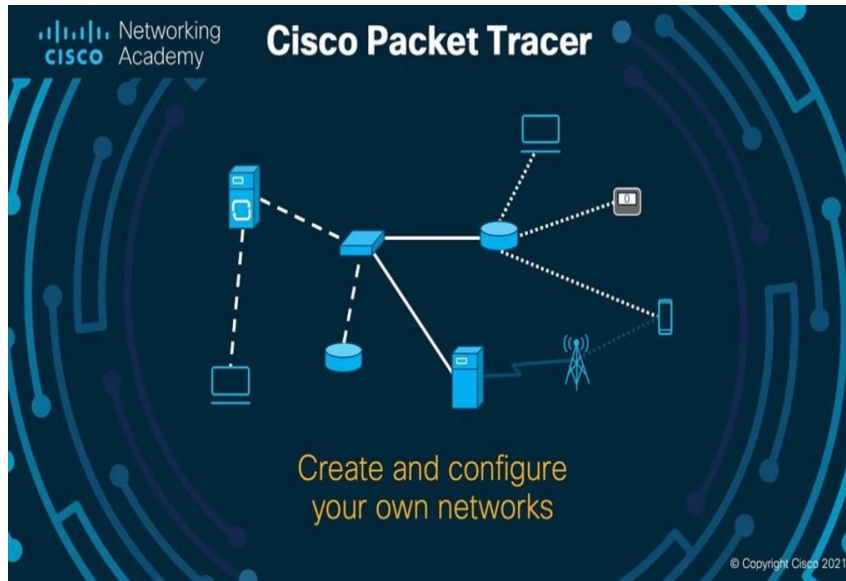
- The maintenance team looks over the software and users' feedback.
- Maintenance is necessary to eliminate errors in the system during the working life and to tune the software.



SOFTWARE AND TOOLS USED

Cisco Packet Tracer

Cisco Packet Tracer is a network simulation software that allows users to simulate complex network topologies and test different configurations without the need for physical hardware. It is widely used in networking courses and certifications, including the Cisco Certified Network Associate (CCNA) and Cisco Certified Network Professional (CCNP) programs.



How to install Cisco Packet Tracer?

To install the Cisco Packet Tracer, follow these steps:

1. Go to the official Cisco Networking Academy website.
2. Login or create an account if you don't have one already.
3. Click on the "Download Packet Tracer" button.
4. Select the appropriate operating system version (Windows, Linux, or macOS) and download the installation file.
5. Once the download is complete, run the installation file and follow the on-screen instructions.
6. Accept the license agreement and choose the installation directory.
7. Click "Install" to begin the installation process.
8. Wait for the installation to be completed. This may take a few minutes.
9. Once the installation is complete, you can launch the Cisco Packet Tracer and start using it.

Steps to create a new network in Cisco Packet Tracer

To create a new network in Cisco Packet Tracer, follow these steps:

1. Open Cisco Packet Tracer.
2. Click on the "New" button in the top left corner of the screen.
3. Select "New Network" from the drop-down menu.
4. Choose the "Blank" option to start with an empty network.
5. Drag and drop devices from the device list on the left side of the screen onto the workspace.
6. Connect the devices using the appropriate cables.
7. Configure each device by double-clicking on it and entering its settings.
8. Save your network by clicking on "File" in the top left corner and selecting "Save" or "Save As".

Components Used

Router: -A router is a networking device that is used to connect multiple devices or networks. It is responsible for directing internet traffic to its intended destination.

Switch: - A switch is a device that connects devices on a computer network and uses packet switching to forward data to its destination. A switch operates at the data link layer (layer 2) of the OSI (Open Systems Interconnection) reference model and can be used to connect devices such as computers, printers, servers, and other switches.

Copper Straight-Through: -A copper straight-through is a type of Ethernet cable used to connect a computer to a network switch or hub. The cable uses the same wires in the same order. This type of cable is commonly used in homes and small office work.

Copper Crossover: -Copper crossover refers to a type of Ethernet cable wiring where the transmit and receive wires are crossed over, allowing for communication between two devices. This is commonly used in older Ethernet networks but has been largely replaced by Auto-MDIX technology in modern networks.

Server: -A server is a computer system or software program that provides functionality to other devices or programs, called clients. Servers store, process, and distribute data and information to enable various applications and services, such as web hosting, email Network, data storage, or network Network.

Wireless Devices: -Wireless devices are electronic devices that use wireless communication technologies, such as Wi-Fi, Bluetooth, or cellular networks, to exchange data and information without the need for physical cables or wires. Examples of wireless devices include smartphones, laptops, smartwatches, and wireless routers, among others. These devices enable users to access the internet, communicate with each other, and perform various tasks wirelessly and remotely.

Firewall: -A firewall is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. It acts as a barrier between a trusted internal network and an untrusted external network, such as the Internet, to prevent unauthorized access, data breaches, and malware attacks. Firewalls can be hardware or software-based and can be configured to block or allow specific types of traffic based on various criteria, such as IP addresses, ports, protocols, and applications.

Cluster: - A cluster in computer networks is a group of interconnected computers or servers that work together as a single system to provide high availability, scalability, and fault tolerance. Clusters can be used for various purposes, such as load balancing, data storage, and processing, and can be managed and monitored as a single entity. Clusters can be implemented using various technologies, such as clustering software, virtualization, or cloud computing, depending on the specific requirements and resources available.

WAN: -WAN stands for Wide Area Network, which is a type of computer network that spans over a large geographic area, such as a state, country, or even the whole world. WANs connect multiple local area networks (LANs) and other devices across different locations using various communication technologies, such as leased lines, satellites, or the Internet. WANs enable organizations to share data and resources, communicate with remote sites, and access cloud-based services and applications, among others.

Multi-Layer Switch: -A multi-layer switch is a network device that can operate at both the data link layer and the network layer of the OSI model. It can switch traffic based on MAC addresses and IP addresses, providing better performance and flexibility than traditional layer 2 switches.

End Devices: - End devices are network devices that are responsible for initiating communication with other devices. These devices include computers, laptops, smartphones, tablets, printers, and servers. They are typically located at the edge of the network and are connected to intermediary devices such as switches, routers, and firewalls to access network resources.

Structure of the Project

Designing a healthcare Network system within Cisco Packet Tracer involves setting up a simulated network infrastructure that mirrors real-world healthcare environments. Here's a detailed breakdown of the project structure:

1. Network Topology Planning:

- Define the network layout, considering the physical layout of the healthcare facility. Plan the placement of devices, servers, and networking equipment to ensure efficient communication between departments like patient rooms, labs, administrative offices, and more.

2. Server Configuration:

- Set up servers to manage various aspects of healthcare operations. This might include:
 - Database Servers: Store patient records, medical history, and other critical information securely.
 - Application Servers: Run software for scheduling appointments, managing inventory, and handling billing.
 - Authentication Servers: Implement user authentication mechanisms to control access to sensitive data.

3. Device Configuration:

- Configure end-user devices such as computers, tablets, and mobile devices for healthcare professionals. Ensure they have access to necessary applications and data while maintaining security through user authentication and access control lists.

4. Network Communication:

- Set up communication systems like VoIP phones and video conferencing tools to facilitate quick communication between healthcare professionals. Implement messaging platforms for internal communication.

5. Security Implementation:

- Apply robust security measures:
 - Firewalls and Intrusion Prevention Systems (IPS): Protect the network from unauthorized access and potential cyber threats.
 - Encryption: Secure sensitive data transmission within the network.
 - Access Controls: Restrict access to patient records based on roles and permissions.

6. Integration of Medical Devices:

- Integrate medical devices (such as patient monitoring equipment, scanners, and diagnostic tools) into the network. Ensure these devices can securely transmit data to the appropriate servers for analysis and storage.

7. Backup and Recovery Solutions:

- Implement backup systems to regularly back up healthcare data to prevent loss in case of

system failures. Set up recovery protocols to quickly restore data in the event of a disaster.

8. Testing and Troubleshooting:

- Test the network extensively to ensure all components work seamlessly. Troubleshoot connectivity issues, configuration problems, and security vulnerabilities to guarantee smooth operations.

9. Documentation and Training:

- Document network configurations, security protocols, and operational procedures. Provide comprehensive training to healthcare staff on using the system effectively and securely.

10. Regulatory Compliance:

- Ensure the healthcare Network system complies with industry regulations (such as HIPAA in the U.S.) regarding patient data privacy and security. Regularly update and adapt the system to meet evolving compliance standards.

This structured approach helps create a comprehensive healthcare Network system within Cisco Packet Tracer, ensuring efficient operations, data security, and compliance with healthcare standards and regulations.

First Step Towards the Project

Certainly! Starting a project in Cisco Packet Tracer involves several steps to create a network topology and configure devices. Here are the initial steps:

1. Planning:

- Define the purpose of your network: Decide what you want to achieve with the network you're creating.

- Identify the devices needed: Determine the types of devices (routers, switches, PCs, servers, etc.) required for your network.

2. Opening Packet Tracer:

- Launch Cisco Packet Tracer on your computer.

3. Creating a New Project:

- Start a new project by clicking on "File" > "New" > "Empty Workspace" or "New" > "Blank" to start from scratch.

4. Adding Devices:

- Drag and drop devices from the device list onto the workspace area. For instance, you might add routers, switches, PCs, etc.
- Connect devices using appropriate cables. Click on a device, select a port, and then click on the port of the device you want to connect to.

5. Configuring Devices:

- Double-click on a device to configure it. This opens a configuration window where you can set IP addresses, configure interfaces, set up routing protocols, etc.
- Configure basic settings like IP addresses, subnet masks, default gateways, etc., depending on the devices and their purpose in the network.

6. Testing Connectivity:

- After configuring devices, test connectivity between them to ensure they can communicate. Use tools within Packet Tracer to test connectivity, like the 'Ping' utility.

7. Saving Your Project:

- Save your project periodically using "File" > "Save As" and provide a name for your project. This ensures you don't lose your progress.

8. Documentation:

- Document your network design and configurations. This could include diagrams, IP address tables, device configurations, and any other relevant information.

9. Experiment and Iterate:

- Experiment with different configurations and scenarios to understand how changes impact the network. This can help you learn more about networking concepts and troubleshooting.

10. Learning Resources:

Flowchart of Healthcare Network System

Creating a flowchart for a healthcare Network system in Cisco Packet Tracer might involve various components such as servers, routers, switches, and end-user devices. While I can't create a flowchart directly within this text interface, I can guide you through the basic structure and components you might consider including in your flowchart:

1. Start: Begin the flowchart with a starting point.

2. User Authentication:

- Represent user login and authentication. This might involve a server for user authentication.

3. Patient Data Input

- Indicate where patient data is entered. This could involve workstations or devices used by healthcare professionals.

4. Data Processing:

- Show how the data is processed. This might involve a central server or multiple servers handling different tasks like data storage, analysis, etc.

5. Database Storage:

- Indicate where and how patient data is stored. This could be a database server.

6. Access Control:

- Show how access to patient data is controlled to ensure privacy and security. Implement firewalls or security protocols.

7. Healthcare Services:

- Represent the different services provided, such as diagnostics, treatments, prescriptions, etc.

8. Communication between Devices:

- Display how different devices communicate within the system. Use routers and switches to indicate network connections.

9. User Interface:

- Show how healthcare professionals interact with the system. This could include computers, tablets, or specialized medical devices.

10. End/Output:

- Conclude the flowchart, depicting the final output or outcome, which could be the provision of healthcare services or generating reports.

When working in Packet Tracer, you can use symbols and devices available in the software to represent different components. For instance:

- Servers: Represent them using the server symbol available in Packet Tracer.
- Routers/Switches: Use appropriate symbols for these networking devices.
- Workstations/Medical Devices: Show these as computer symbols or specific medical device icons.

Conclusion

A Healthcare Network System implemented on Cisco Packet Tracer presents an innovative solution for enhancing healthcare services. Through this project, we've achieved an integrated system that efficiently manages patient records, facilitates communication among medical staff, ensures data security, and optimizes resource allocation. The system's robustness lies in its ability to streamline operations, improve patient care, and enable quick access to critical information, thereby enhancing the overall efficiency and effectiveness of healthcare delivery. Moving forward, continuous updates and refinements will be essential to adapt to evolving healthcare needs and technological advancements.