CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION OF THE PROJECT

The requirement for PC systems administration was an effect of the requirement to use PCs for exchanging information in an association in form of messages or packets, exchanging documents and data bases, etc. Regardless of whether the organization is situated in one structure or spread over a huge grounds, the requirement for systems administration the computers cannot be over underscored. As the name assumes, a Local Area Network (LAN) connects PCs in a limited physical territory. It gives high-data transfer capacity correspondence over cheap transmission media .The corporate

LAN has developed from an easy basis business segment to a profoundly vibrant, noticeable core asset that activities depend on to help everyday tasks to their market accomplishment. E-Governance is a system of open segment order and is a significant advance in the adjustment of metropolitan organization, with E-Governance joins the utilization of ICT's [6] by government's association. The anticipated calculation utilizes insight of calculation for security of substance in e-governance executing a standard based methodology from computational Knowledge and client's present purpose of area data. On a work area PC, a recreation model had been actualized and assessments utilizing meandering client's continuous position-based data exhibits that proposed system can capably preserve wandering client position secrecy while giving better execution, ensured position privacy, and better nature of administration in e-Governance.

NETWORKING

1.2 Network

In one network more than one computer connected with each other through centralized device. They can share files and resources with each other. Networks are the method to share hardware resources and software resources. We can share the resources with the help of operating system like windows, Linux, UNIX etc. To connect multiple networks we have to use internetworking devices like router, bridge, layer 3, switches etc.

1.2.1 LAN

LAN stands for Local Area Network. The scope of the LAN is within one building,

one school or within one lab. In LAN (Hub), media access method is used CSMA/CD in which each computer sense the carrier before sending the data over the n/w. If carrier is free then you can transmit otherwise you have to wait or you have to listen. In multiple accesses each computer has right that they can access each other. If two computers sense the carrier on same time then the collision occur. Each computer in the network aware about the collision. Now this stop transmitting and they will use back off algorithm. In which random number is generated. This number or algorithm is used by each computer. Who has short number or small number, he has first priority to transmit the data over the network and other computers will wait for their turn.

1.2.2 WAN

WAN stands for Wide Area Network, in which two local area networks are connected through public n/w. it may be through telecommunication infrastructure or dedicated lines. For e.g.: - ISDN lines, Leased lines etc.In which we can use WAN devices and WAN technology. You can also connect with your remote area through existing Internetwork called Internet.

1.3 Devices

1.3.1 Hub

Hub is centralized device, which is used to connect multiple workstations. There are two types of Hub: -

(i) Active Hub

(ii) Passive Hub

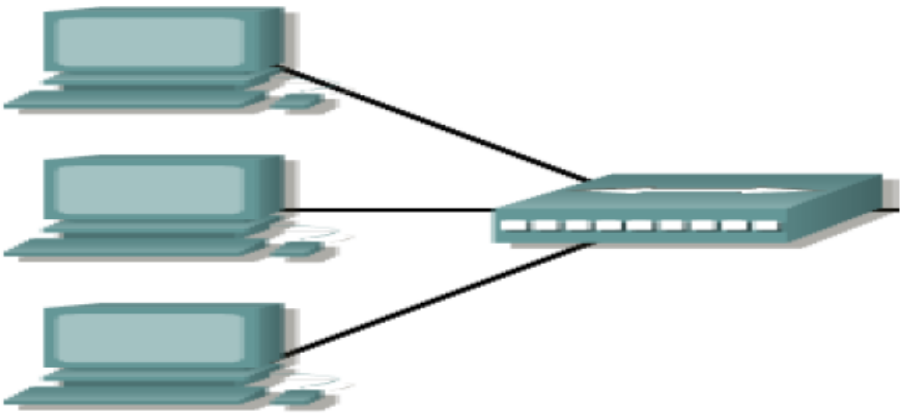


***Fig. 1.1**. PCS' CONNECTED VIA HUB*

It has no special kind of memory. It simply receives the frame (data) and forwards it to all its nodes except the receiving node. It always performs broadcasting. In case of hub, there is one collision domain and one broadcast domain. In case of hub, the media access method is used CSMA/CD (Carrier Sense Multiple Access/Collision Detection).

- Active Hub

  In Active hub, it receives the frame regenerate and then forward to all its nodes.

- Passive Hub

  In Passive hub, it simply receives the frame and forward to all its connected nodes.

We cannot perform LAN segmentation using hub.

1.3.2 Switch

Switch is also used to connect multiple workstations. Switch is more intelligent than hub. It has special kind of memory called mac address/filter/lookup table. Switch reads mac addresses. Switch stores mac addresses in its filter address table. Switch when receives frame, it reads the destination mac address and consult with its filter table. If he has entry in its filter table then he forwards the frame to that particular mac address, if not found then it performs broadcasting to all its connected nodes.

Every port has its own buffer memory. A port has two queues one is input queue and second is output queue. When switch receives the frame, the frame is received in input queue and forward from output queue. So in case of switch there is no chance or place for collisions. In case of switch, the media access method is used CSMA/CA (Carrier Sense Multiple Access/ Collision Avoidance). Switches provide more efficiency, more speed and security.

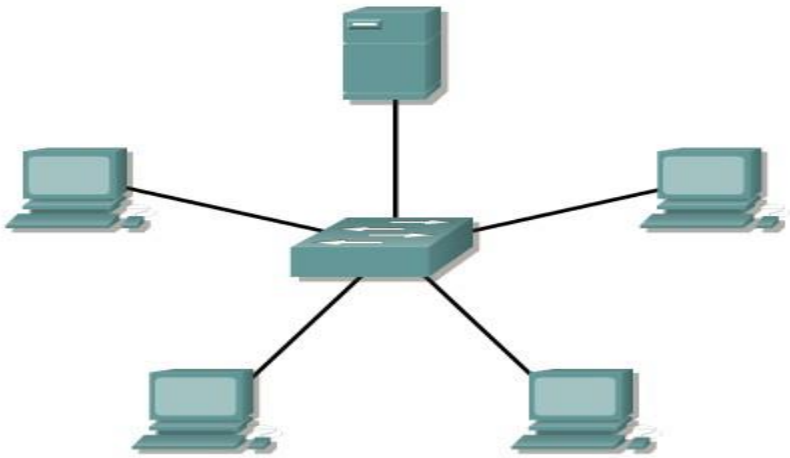


Fig. 1.2 *PCS' CONNECTED VIA SWITCH*

There are two types of switches: -

I. Manageable switches (can be configured with console cable).
II. Non-manageable switches.

We can perform LAN segmentation by using switches.

1.3.3 Bridge

Bridge is a hardware device, which is used to provide LAN segmentation means it is used for break the collision domain. It has same functionality as performed by switch. We can use bridge between two different topologies. It has fewer ports. Each port has a own buffer memory. It works on Data Link Layer of OSI model. It also read mac address and stores it in its filter table. In case of bridge there is one broadcast domain.

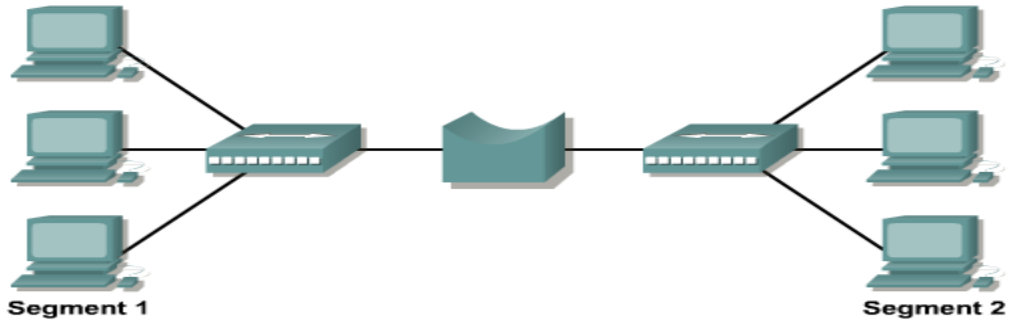


FIG. 1.3 *PCS' CONNECTED VIA BRIDGE*

1.3.4 Router

Router is hardware device, which is used to communicate two different networks. Router performs routing and path determination. It does not perform broadcast information.

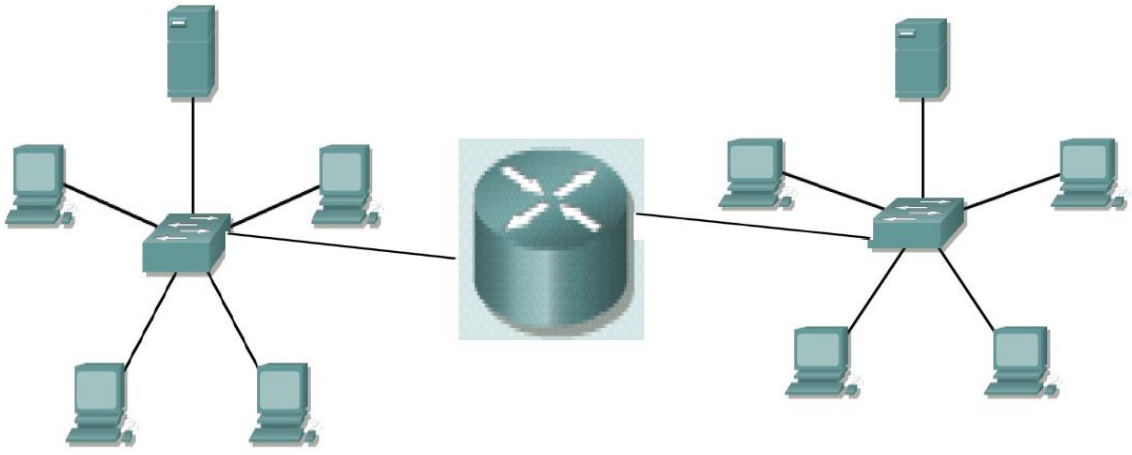


FIG. 1.4 *DIFFERENT N/Ws CONNECTED VIA ROUTER*

There are two types of routers: -

I. **Hardware Routers** are developed by Cisco, HP.

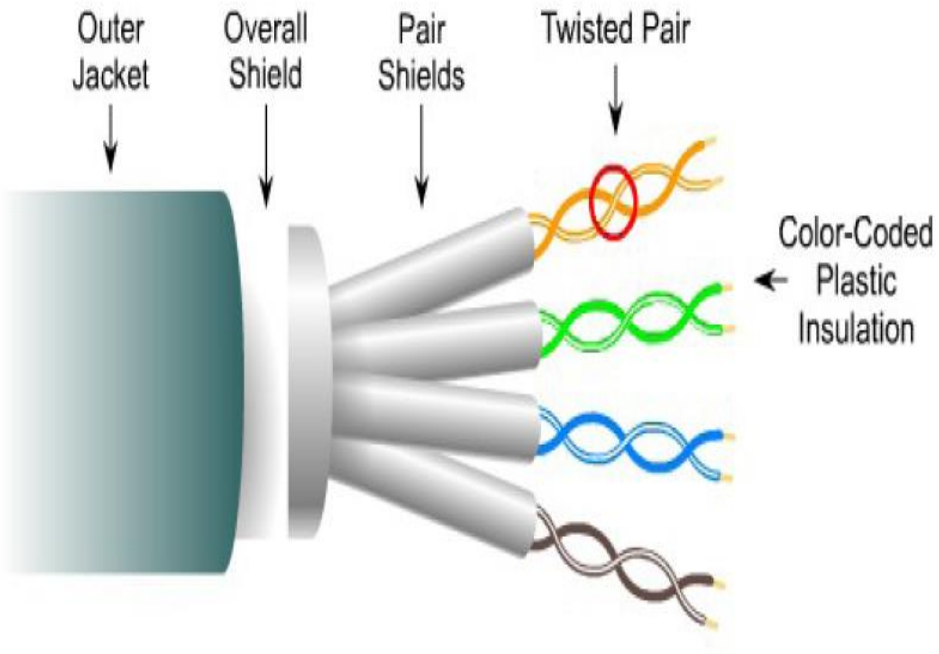
II. **Software Routers** is configured with the help of routing and remote access. This feature is offered by Microsoft. This feature is by default installed, but you have to enable or configure it. Hardware routers are dedicated routers. They are more efficient. But in case of software routers, it has fewer features, slow performance. They are not very much efficient.

1.3.5 LAN Card

LAN card is media access device. LAN card provide us connectivity in the network. There is a RJ45 (Registered Jack) connector space on the LAN card. RJ45 is used in UTP cable. There is another led which is also called heartbeat of LAN card. When any activity occurs it may be receiving or transmitting any kind of data. This led start blinking and also tells us the status of LAN card.

FIG. 1.5 *Internal network interface card* ***Fig. 1.6*** *PCMCIA Network interface card*

1.4 UTP (Unshielded Twisted Pair)



Pin Configuration

	Hub/Switch	PC/Router/Online Printer	Uplink port(Hub/Switch)
1	Rx+	Tx+	Tx+
2	Rx-	Tx	Tx
3	Tx+	Rx+	Rx+
4	NC	NC	NC
5	NC	NC	NC
6	Tx	Rx	Rx
7	NC	NC	NC
8	NC	NC	NC

TABLE 1.1 Pin Configuration

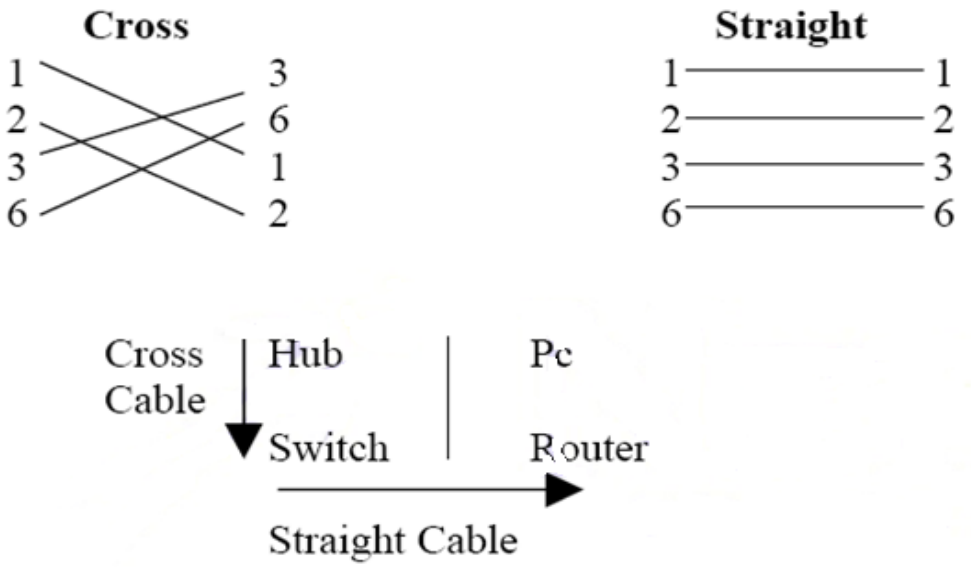


Fig. 1.8 CrosS & Straight Cable

Straight Cable

1 Orange white - Orange white

2 Orange - Orange

3 Green white - Green white

4 Blue - Blue

5 Blue white - Blue white

6 Green - Green

7 Brown white - Brown white

8 Brown – Brown

Cross Cable

1 Orange white - Green white

2 Orange - Green

3 Green white - Orange white

4 Blue - Blue

5 Blue white - Blue white

6 Green - Green

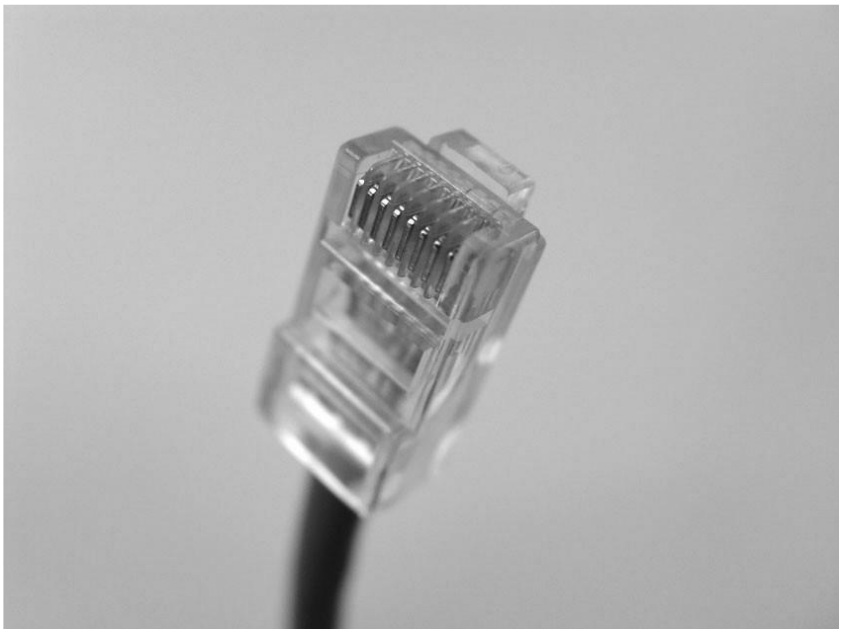
7 Brown white - Brown white

8 Brown – Brown

1.5 Administrator model for networking

Server software: - Software which are used to giving services are server software.

Client software: - which gets services.



1.6 OVERVIEW

The requirement for PC systems administration was an effect of the requirement to use PCs for exchanging information in an association in form of messages or packets, exchanging documents and data bases, etc. Regardless of whether the organization is situated in one structure or spread over a huge grounds, the requirement for systems administration the computers cannot be over underscored. As the name assumes, a Local Area Network (LAN) connects PCs in a limited physical territory. It gives high-data transfer capacity correspondence over cheap transmission media .The corporate LAN has developed from an easy basis business segment to a profoundly vibrant, noticeable core asset that activities depend on to help everyday tasks to their market accomplishment. E-Governance is a system of open segment order and is a significant advance in the adjustment of metropolitan organization, with E-Governance joins the utilization of ICT's by government's association. The anticipated calculation utilizes insight of calculation for security of substance in e-governance executing a standard based methodology from computational Knowledge and client's present purpose of area data. On a work area PC, a

recreation model had been actualized and assessment utilizing meandering client's continuous position-based data exhibits that proposed system can capably preserve wandering client position secrecy while giving better execution, ensured position privacy, and better nature of administration in e-Governance.

1.7 OBJECTIVE

The following are the main objectives of this study:

1. Implementing RAIVPN by creating LAB environment in Packet Tracer or GNS3
2. Provide remote access to only authorized personnel to various Networking devices located within the periphery of University
3. Mitigating the overhead of sharing files and confidential data using the internet from both sides by providing remote access to remote users.

1.8 ORGANIZATION PROFILE

Ascox Techno Soft is a leading software development and web designing company which born on 2014n in Madurai, TamilNadu, India. We are the young and energetic team committed to the permit of excellence. Our successful projects with client requirements have represented our reputation as superior providers. Ascox Techno Soft has established multi-branches at Chennai and Coimbatore for Continuous and better serve its Clients. Ascox Techno Soft's differentiation point meets with three philosophies.

- ✓ True Participation
- ✓ Perfect Understanding
- ✓ Patience in completing the job

In the past three years Ascox Techno Soft travelled more than 35 projects and has a large client's base of more than 20 clients all over India.

Our Mission and Vision

- ✓ Our Mission is to enriching the business growth of our clients with creative design and development to deliver high qualified solutions.
- ✓ Our Vision is to develop efficient software solutions to the most complex requirements with the highest levels of integrity. Professionalism and technological

capabilities. When the project is specific and the result cannot fulfill your requirements-you need efficiently developed solutions for your software, being Ascox Techno Soft’s clients, you will receive a perfect and expected solute.

CHAPTER 2

SYSTEM ANALYSIS

2.1 EXISTING SYSTEM

The present world is incomprehensible without messages, web based banking, talks and other significant administrations gave by the web. In this administrations PC system assume significant job to trade the data starting with one point then onto the next. So we can say correspondence arrange, alongside transportation systems, have turned out to be basic foundation in every general public that permits the progression of individuals data and merchandise. For interconnecting of several parts, organize topology depict physical as well coherent appearance and correlation between plan of PCs, links and other segment in an information correspondence system and how to be utilized for taking a parcel from one gadget and sending it through the system to another gadget on an alternate system. So in this article, we are planning a system utilizing a system test system device for example Cisco parcel tracer, while keeping centre around transport, star, work topology to comprehend different ideas, for example, topology structure, IP address arrangement and how to drive data in type of bundle in a solitary system. In this article, we actualized different topologies with best possible significant ideas similar to DHCP, DNS in a solitary system exploiting Packet Tracer tool. We have utilized basic system with switch, switch arrangement and send parcel information starting with one gadget then onto the next.

Arranging gadget sending is a principal issue in executing remote sensor organizes Wireless Sensor Networks applications. This plan practice decides types, numbers and areas of gadgets so as to construct an amazing and powerful framework utilizing gadgets of restricted vitality supply and compelled limits. The arrangement plan chooses the points of confinement of numerous natural properties of a WSN, for example, inclusion, network, charge, and lifetime. In our proposal, we address the gadget sending arranging issues identified with enormous scale WSN frameworks. We consider a run of the mill arrangement of arranging situation in a varied two-level WSN made out of sensor hubs and hand-off hubs. Sensor hubs structure the lower level of the system and are liable for giving palatable detecting inclusion to the application. We along these lines address the sensor hub arrangement regarding the detecting inclusion and hand-off hub sending as far as the

correspondence network and framework lifetime. For sensor hub organization, we propose an inclusion ensured sensor hub organization structure procedure. Utilizing this method, the detecting inclusion is finished regardless of whether sensor hubs are arbitrarily scattered inside a limited range from its objective areas as indicated by a given network design. So as to check the expanded expense because of additional sensor hubs that are utilized in the inclusion ensured organization, while as yet keeping up a great detecting inclusion.

2.2 PROPOSED SYSTEM

For transfer hub organization, we propose to broaden the framework lifetime by conveying hand-off hubs as per a thickness work, which is upgraded because of the vitality utilization rate, with the goal that the vitality is scattered at an around same rate over the system. Gadget arrangement is a significant designing issue in actualizing WSN applications. The sorts, numbers, and areas of gadgets must be reasonably arranged with the goal that presentation prerequisites, for example, detecting inclusion quality, organize network, lifetime, and unwavering quality are altogether met while keeping the cost moderate.

This issue is especially significant for enormous scale WSN applications, in which countless gadgets will be utilized. Because of costly work cost, the detachment of the detecting field and the qualities of territory, purposeful situation of gadgets by people or machines can be troublesome, or even totally infeasible. In these circumstances, arrangement mistakes are unavoidably acquired in the sending exercise. Accordingly, it is important to mull over these sending blunders when the gadget arrangement plan is led. In this proposition, we propose an enormous scale WSN arrangement system under which sending blunders are joined into the organization models and the issue definitions. We likewise propose a progression of strategies and instruments to address a lot of sending issues. Computation (GCA) and two progressive utility based covering counts rang base covering (BCA) and cross breed covering (HCA). A movement of preliminaries has been directed to evaluate these computations under various structure settings. Preliminary outcomes show that, GCA has the most surprising accomplishment rate, anyway encounters a long covering time especially when the security level is high; BCA has the best adequacy, yet its anonymization cost, covering accomplishment extent and postponed time are modestly progressively terrible; HCA achieves the best as a rule execution to the extent diverse execution estimation.

CHAPTER 3

SYSTEM STUDY

3.1 FEASIBILITY STUDY

A feasibility study is concerned to select the best system that meets performance requirements. These entities are an identification description, an evaluation of candidate systems and the selection of the best system for the job.

- Economic Feasibility
- Technical Feasibility
- Behavioural Feasibility
- Operational Feasibility
- Schedule Feasibility

3.1.1 ECONOMIC FEASIBILITY:

Economic analysis is the most frequently used method for evaluating the effectiveness of the candidate system. More commonly known as cost/benefit analysis, the procedure is to determine the benefits and savings that benefits outweigh costs, and then the decision is made to design and implement the system. Otherwise, further justification or alterations in the proposed system will have to be made if it is to have an enhancement to approve.

3.1.2 TECHNICAL FEASIBILITY:

Technical analysis centre on the existing computer system (Hardware, Software etc) and to what extend it can support the proposed addition. This involves financial considerations to accommodate technical enhancement. If the budget is a serious constraint, then the project is judged not feasible.

3.1.3 BEHAVIOURAL FEASIBILITY:

An estimate should be made of how strong a reaction the user staff is likely to have toward the development of a computerized system. It is common Knowledge the computer installations have something to do understandable that the introduction of a candidate system requires special effort to educate, sell and train the Staff on new ways of considering business.

3.1.4 OPERATIONAL FEASIBILITY:

Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development.

3.1.5 SCHEDULE FEASIBILITY:

A project will fail if it takes too long to be completed before it is useful. Typically this means estimating how long the system will take to develop, and if it can be completed in a given time period using some methods like payback period. Schedule feasibility is a measure of how reasonable the project timetable is. Given our technical expertise, are the project deadlines reasonable? Some projects are initiated with specific deadlines. You need to determine whether the deadlines are mandatory or desirable.

3.1.6 FEASIBILITY ANALYSIS

Technical Feasibility

Familiarity with the application

There was a medium familiarity with the application. The system developed was outside of anything done before at Cisco. Customized product demonstrations have previously been created on an ad-hoc basis within the company, but there has been no system that manages and automates the process as is being proposed. Therefore, a careful technical analysis was required to try to ensure that the system meets the needs of all the stakeholders.

Familiarity with the technology

There was a medium familiarity with the technology. The members of the product group had some prior knowledge of Cisco Contact Center solution software. The software, however, is complicated and contains many components. Therefore, it took some time for the project team to learn how to use the software to be able to build the system. The team had excellent knowledge of the programming tools and applications used for implementation of the system. Project size this was a medium to large size project. Much analysis was needed for a proper implementation. Development of the system was somewhat complex. Much work was required to ensure that the application interacts with the rest of Contact Center solution correctly and that the application has a working and easy to use deployment capability.

3.2 Economic Feasibility

Direct costs to Cisco for this project amounted to a project sponsorship fee of $15,000. Some of the economic benefits of the system can be quantified. One projected benefit of the system is time savings to employees when creating customized product demonstrations. While this is not an extensive activity at present, the potential savings would accumulate quickly.

While making many broad assumptions, this analysis shows that the system has great potential for saving employee time and cost to the company. Another desired benefit is increased sales due to improved customization of product demonstrations. While this is difficult to directly quantify, the potential sales increases are likely to be significant. Many current demos are done using either generic demo resources or an example vertical that is not in line with the business of the company for which the product is being demonstrated. A custom demo has potential to make the product more appealing to customers and lead to more sales. Therefore, the project appears to have a good economic feasibility.

3.3 Organizational Feasibility

Organizational feasibility appears to be medium. The project is aligned with goals of the company. Company staff has expressed a desire to have such resources available. On

the other hand, only four stakeholders have participated by providing feedback on project prototypes. Therefore, eventual acceptance of the system by end users remains uncertain.

CHAPTER 4

SYSTEM SPECIFICATION

4.1 SOFTWARE REQUIREMENTS

Operating System : Windows 7 and above

Front End : Packet Tracer5.2 and above

Back end : CCNA

Language : Network comments

4.2 HARDWARE REQUIREMENTS

Processor : Pentium IV 2.4 GH

Hard disk : 80 GB

Ram : 512

CHAPTER 5
SOFTWARE DESCRIPTION

Cisco Packet Tracer as the name suggests, is a tool built by Cisco. This tool provides a network simulation to practice simple and complex networks. As Cisco believes, the best way to learn about networking is to do it. The main purpose of Cisco Packet Tracer is to help students learn the principles of networking with hands-on experience as well as develop Cisco technology specific skills. Since the protocols are implemented in software only method, this tool cannot replace the hardware Routers or Switches. Interestingly, this tool does not only include Cisco products but also many more networking devices. Using this tool is widely encouraged as it is part of the curriculum like CCNA, CCENT where Faculties use Packet Trace to demonstrate technical concepts and networking systems. Students complete assignments using this tool, working on their own or in teams. Engineers prefer to test any protocols on Cisco Packet Tracer before implementing them. Also, Engineers who would like to deploy any change in the production network prefer to use Cisco Packet Tracer to first test the required changes and proceed to deploy if and only if everything is working as expected. This makes the job easier for Engineers allowing them to add or remove simulated network devices, with a Command line interface and a drag and drop user interface.

Workspace:

1. **Logical**
   Logical workspace shows the logical network topology of the network the user has built. It represents the placing, connecting and clustering virtual network devices.

2. **Physical**
   Physical workspace shows the graphical physical dimension of the logical network. It depicts the scale and placement in how network devices such as routers, switches and hosts would look in a real environment. It also provides geographical representation of networks, including multiple buildings, cities and wiring closets.

Key Features:

- Unlimited devices
- E-learning

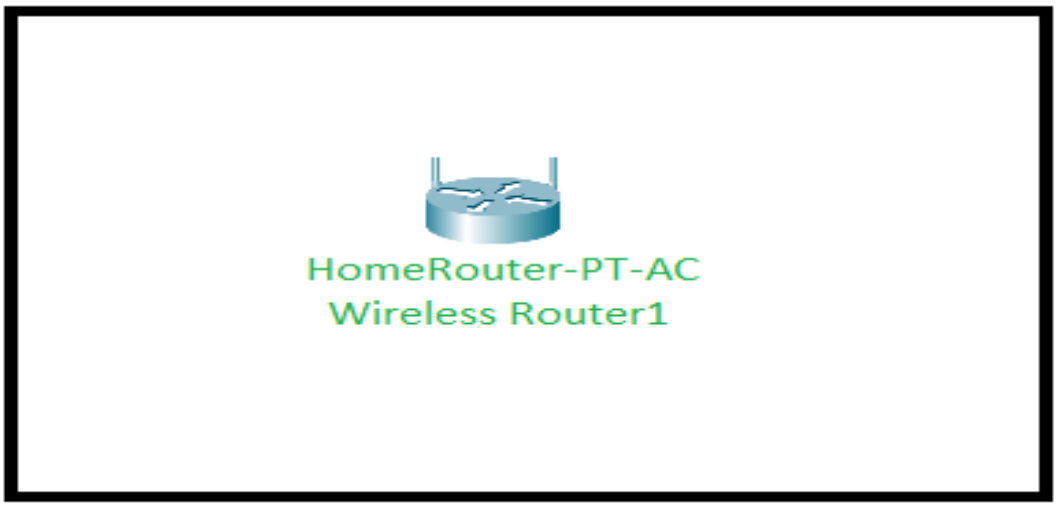
- Customize single/multi user activities
- Interactive Environment
- Visualizing Networks
- Real-time mode and Simulation mode
- Self-paced
- Supports majority of networking protocols
- International language support
- Cross platform compatibility

Basic Home Network using Packet Tracer

Packet Tracer is a network simulation tool that allows us to create network topologies by building virtual networking devices. Packet Tracer is highly encouraged for network enthusiasts as it allows them to have keen in-depth knowledge of networking. Let us see how to easily create a simple home network using Packet Tracer.

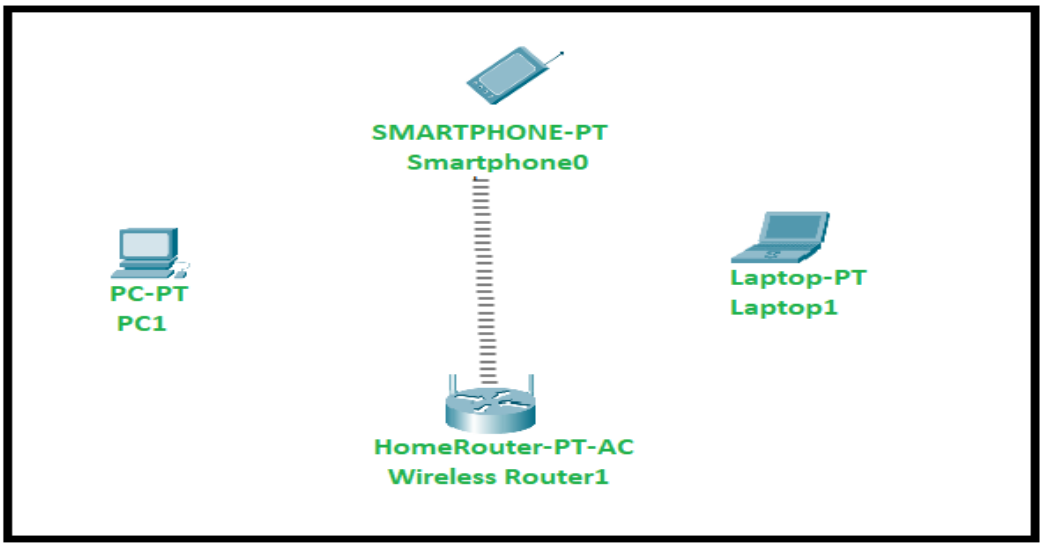
Step-1:

Open Packet Tracer and pick Home Router from Wireless Devices and place it on the workspace.



Step-2:

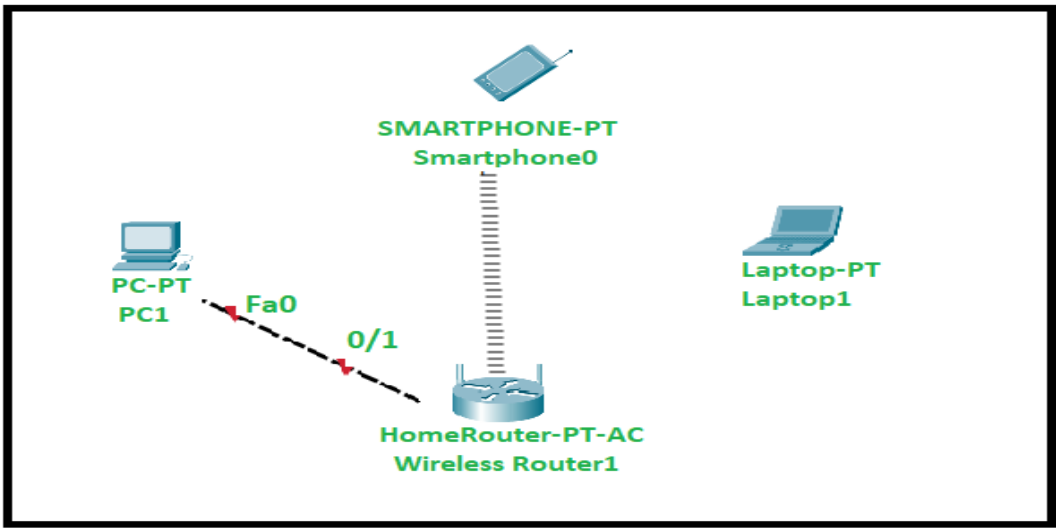
Place Smartphone, PC, Laptop from End Devices on Workspace.



Notice that Smartphone automatically connects to the home router after placing it on the workspace

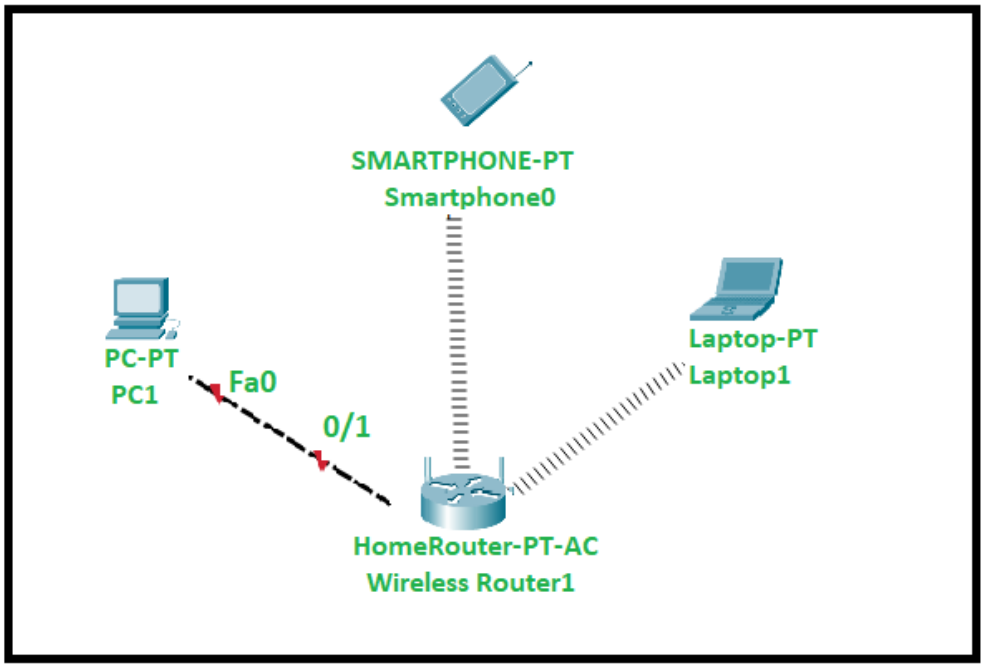
Step-3:

Connect the pc to the home router by using Copper Cross-Over wire available from Connections by configuring pc to FastEthernet0 and Home Router to GigabitEthernet 1.



Step-4:

To connect Laptop to Home Router we need to update a pin in the laptop's configuration, to do this click on the laptop and turn of the laptop and find the pin WPC300N and place it in the laptop.



Note : To update the pin with WPC300N, the laptop must be turned off.

Basics of Computer Networking

Open system:

A system which is connected to the network and is ready for communication.

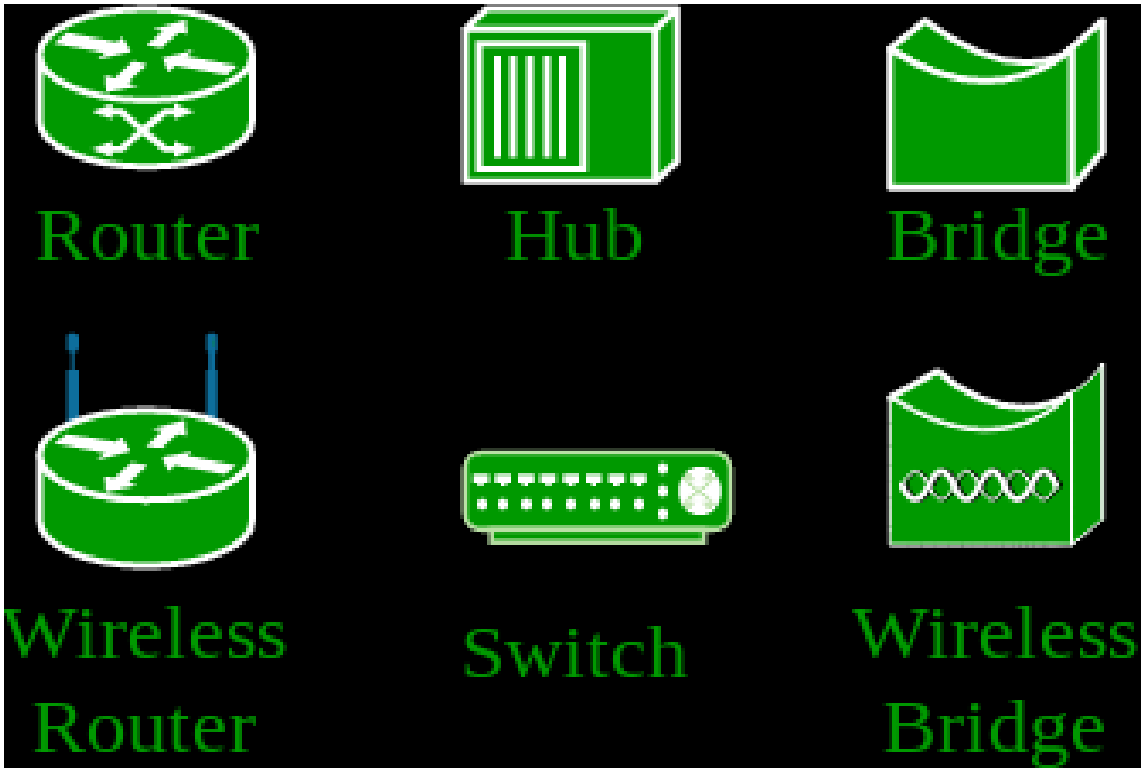
Closed system:

A system which is not connected to the network and can't be communicated with.

Computer Network:

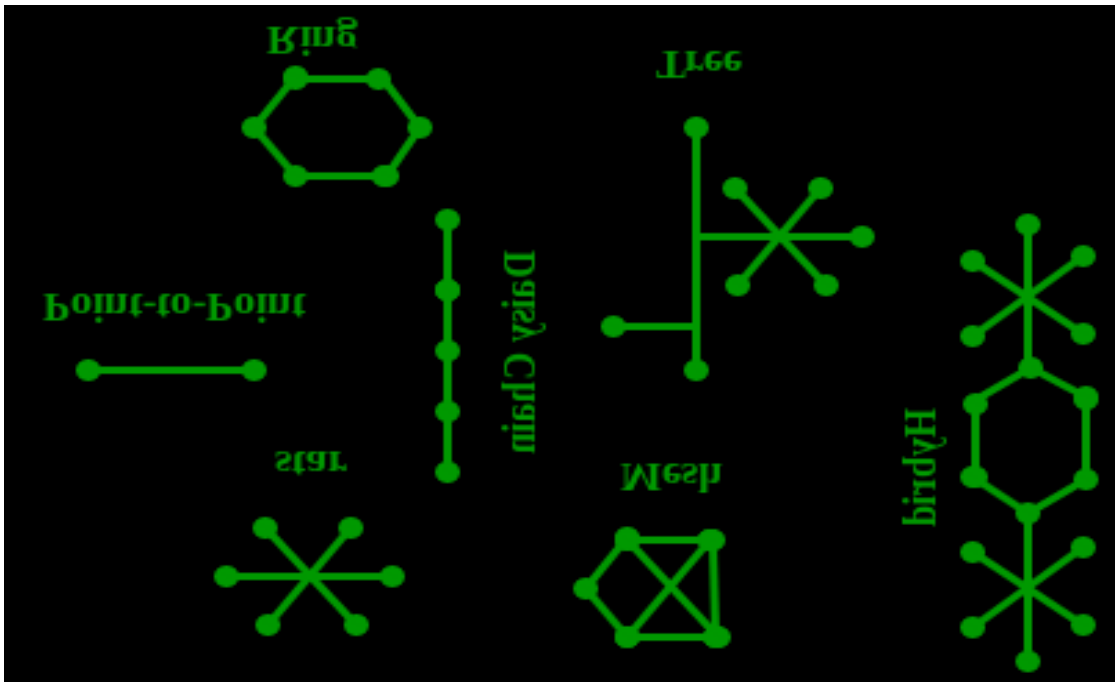
An interconnection of multiple devices, also known as hosts, that are connected using multiple paths for the purpose of sending/receiving data or media. Computer networks can also include multiple devices/mediums which help in the communication between two

different devices; these are known as **Network devices** and include things such as routers, switches, hubs, and bridges.



Network Topology:

The layout arrangement of the different devices in a network. Common examples include: Bus, Star, Mesh, Ring, and Daisy chain.



OSI:

OSI stands for **Open Systems Interconnection**. It is a reference model that specifies standards for communications protocols and also the functionalities of each layer.

Protocol:

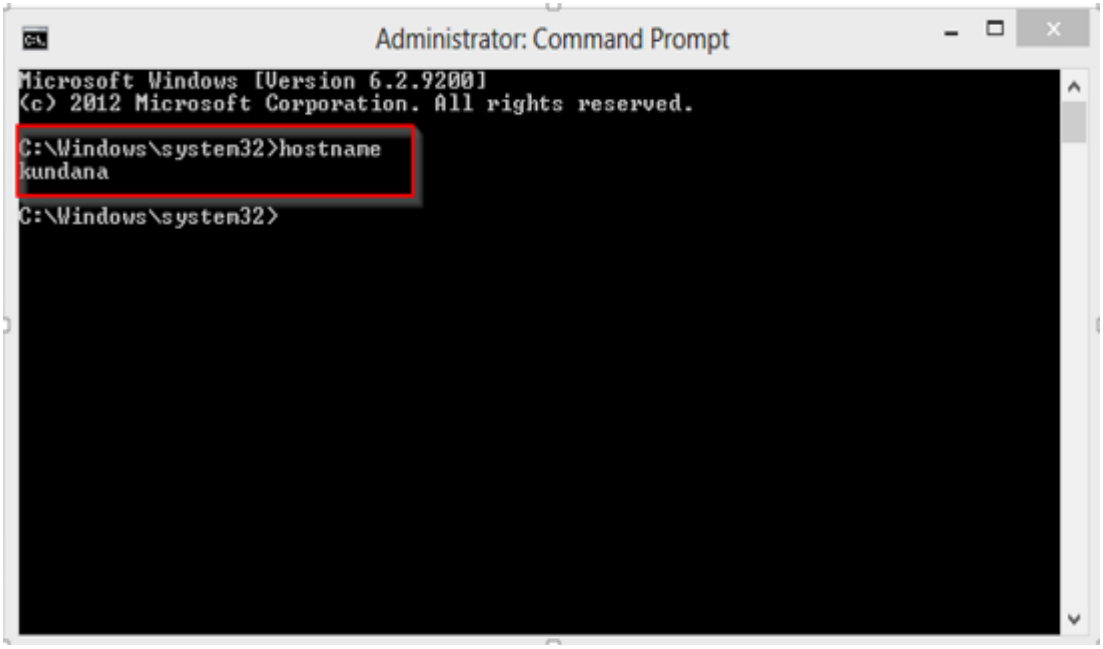
A protocol is the set of rules or algorithms which define the way how two entities can communicate across the network and there exists different protocol defined at each layer of the OSI model. Few of such protocols are TCP, IP, UDP, ARP, DHCP, FTP and so on.

UNIQUE IDENTIFIERS OF NETWORK

Host name:

Each device in the network is associated with a unique device name known as Hostname.

Type “hostname” in the command prompt(Administrator Mode) and press ‘Enter’, this displays the hostname of your machine.



IP Address (Internet Protocol address):

Also known as the Logical Address, the IP Address is the network address of the system across the network. To identify each device in the world-wide-web, the Internet Assigned Numbers Authority (IANA) assigns an IPV4 (Version 4) address as a unique identifier to each device on the Internet. The length of an IPv4 address is 32-bits, hence, we have 2^{32} IP addresses available. The length of an IPv6 address is 128-bits.

Type "ipconfig" in the command prompt and press 'Enter', this gives us the IP address of the device.

MAC Address (Media Access Control address):

Also known as physical address, the MAC Address is the unique identifier of each host and is associated with its NIC (Network Interface Card). A MAC address is assigned to the NIC at the time of manufacturing. The length of the MAC address is : 12-nibble/ 6 bytes/ 48 bits *Type "ipconfig/all" in the command prompt and press 'Enter', this gives us the MAC address.*

Port:

A port can be referred to as a logical channel through which data can be sent/received to an application. Any host may have multiple applications running, and each of these applications is identified using the port number on which they are running.

A port number is a 16-bit integer, hence, we have 2^{16} ports available which are categorized as shown below:

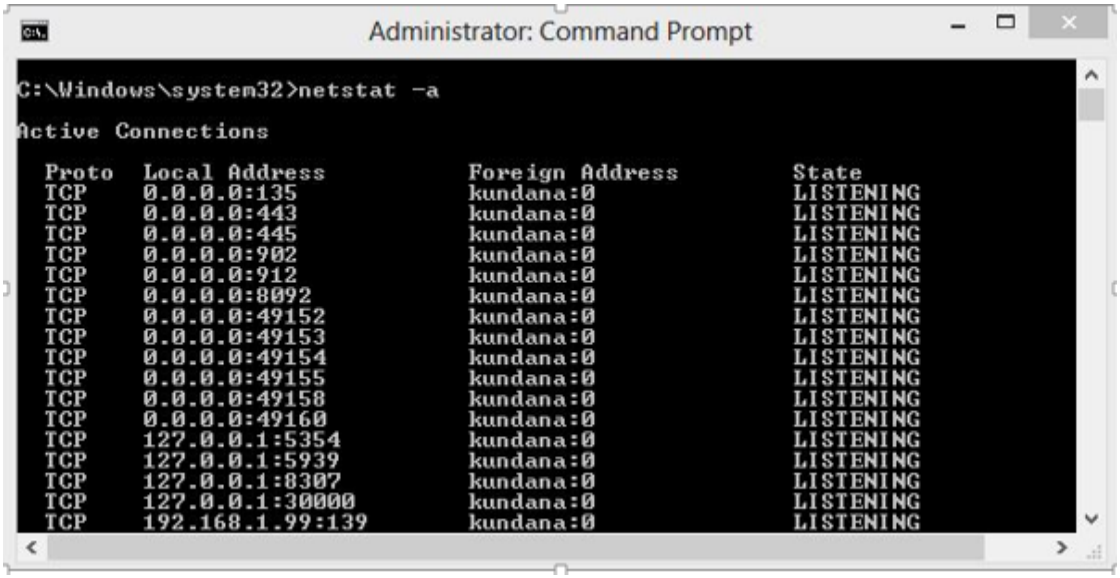
Port Types	**Range**
Well known Ports	0 – 1023
Registered Ports	1024 – 49151

Ephemeral Ports 49152 – 65535

Number of ports: 65,536

Range: 0 – 65535

*Type "**netstat -a**" in the command prompt and press 'Enter', this lists all the ports being used.*



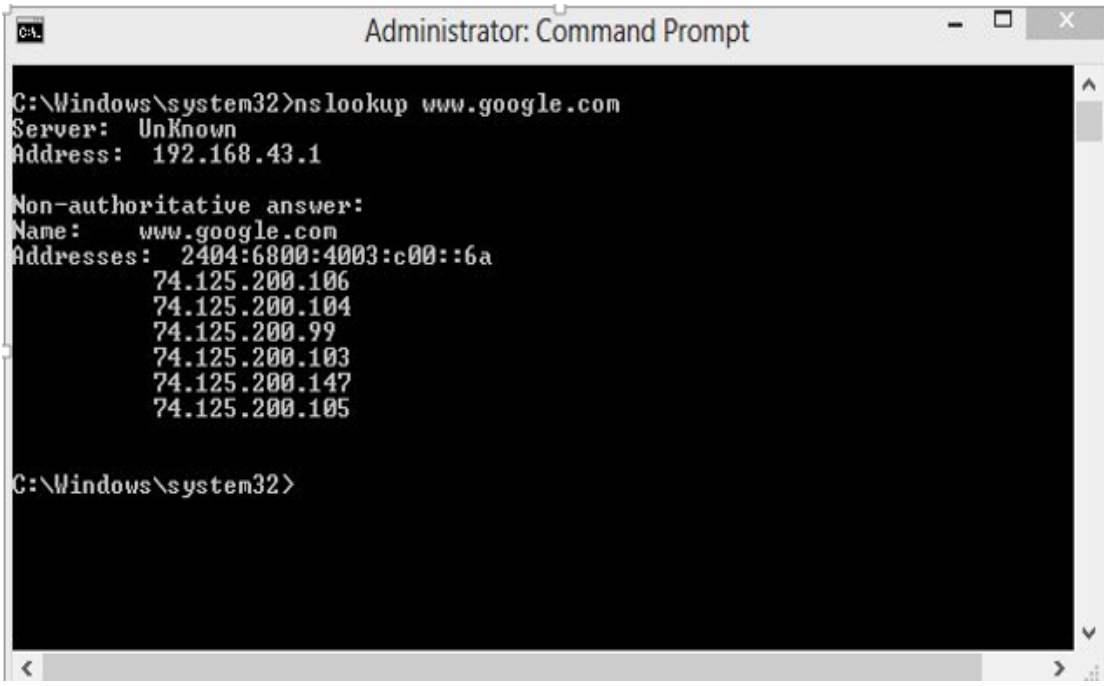
Socket:

The unique combination of IP address and Port number together are termed as Socket.

Other related concepts

DNS Server:

DNS stands for **Domain Name system**. DNS is basically a server which translates web addresses or URLs (ex: www.google.com) into their corresponding IP addresses. We don't have to remember all the IP addresses of each and every website. The command '**nslookup**' gives you the IP address of the domain you are looking for. This also provides the information of our DNS Server.



ARP:

ARP stands for **Address Resolution Protocol**. It is used to convert an IP address to its corresponding physical address (i.e., MAC Address). ARP is used by the Data Link Layer to identify the MAC address of the Receiver's machine.

RARP:

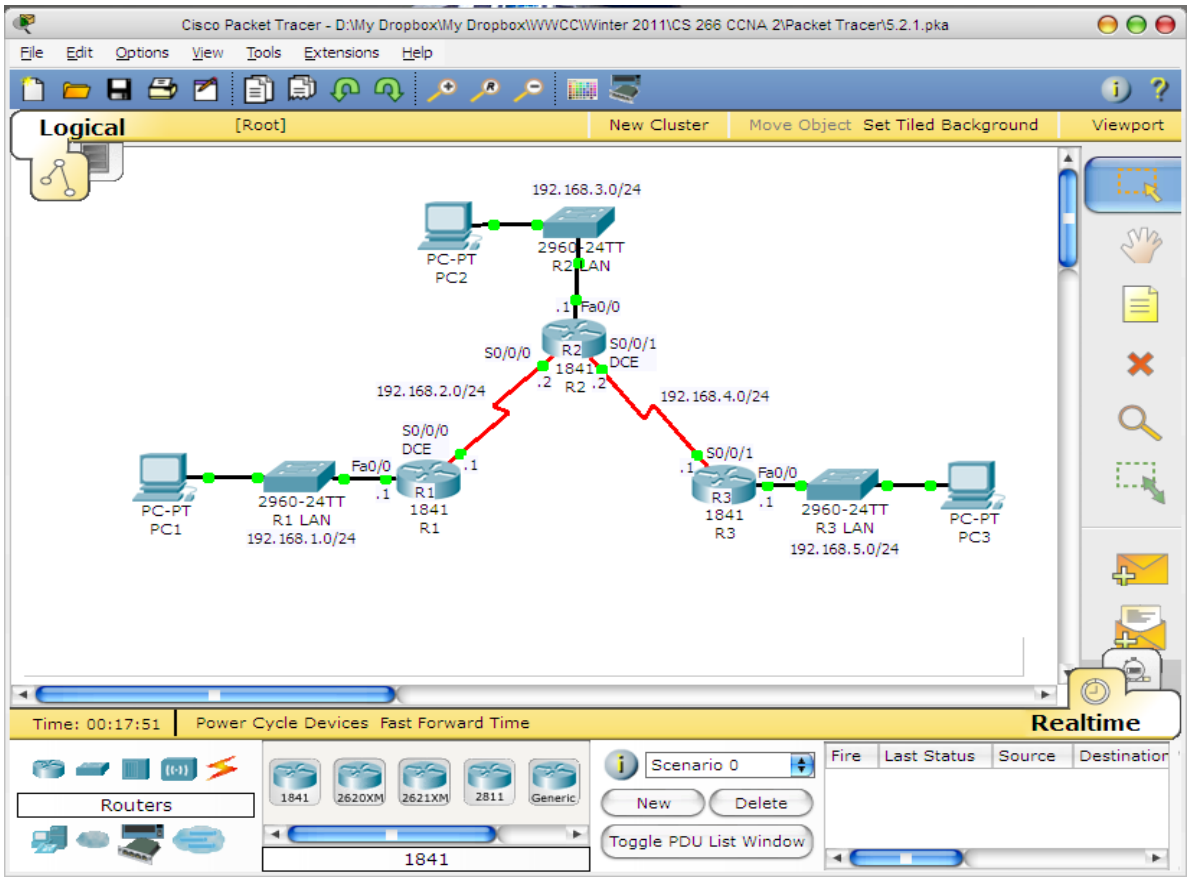
RARP stands for **Reverse Address Resolution Protocol**. As the name suggests, it provides the IP address of the device given a physical address as input. But RARP has become obsolete since the time DHCP has come into the picture.

What is Cisco Packet Tracer?

Packet Tracer is a networking simulation tool (as stated above) used for practice, discovery, and troubleshooting designed by Cisco. Cisco's official website describes Packet Tracer as:

*"**A powerful network simulation program that allows students to experiment with network behavior and ask 'what if' questions.**"*

As stated, it is a powerful network simulator to help networking students achieves the optimum learning experience while also gaining practical networking and technology skills to develop their expertise.



It teaches the student to create a network on an unlimited number of devices. They can experience troubleshooting without buying the real Cisco switches and routers. However, one can never use it to replace actual switches or routers.

This simulation-based learning atmosphere helps the student to strengthen their skills while also improving their critical thinking, problem-solving, and decision-making skills. It offers an interactive and practical way to learn networking protocols.

Some Use Cases of Cisco Packet Tracer

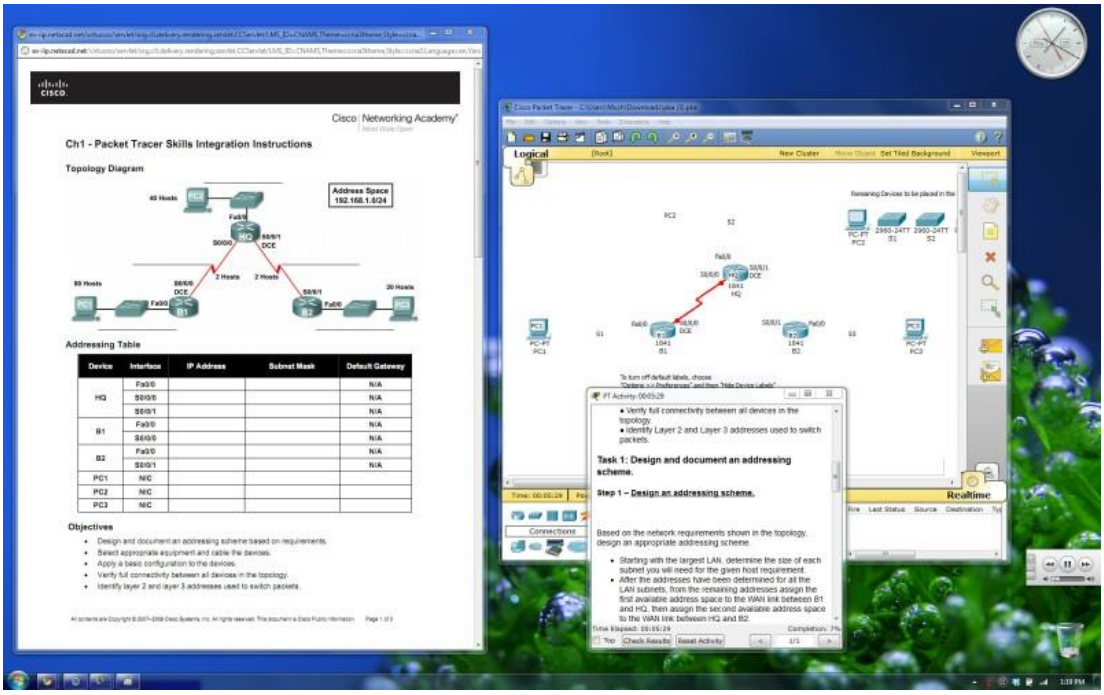
- **Cisco Certifications**

Packet Tracer is an essential tool as it helps to prepare for network exams like Cisco Certified Network Associate or CCNA Routing and Switching. It requires the candidates to complete practice labs and virtual environments that simulate a Cisco network.

CCNA is one of the highly reputed entry-level networking certification exams. The CCNA Routing and Switching certification makes sure that students have a firm grasp of the foundational technologies of networking, and their knowledge is up to date with the demands of the modern-day industry.

This certification stays relevant with skill sets needed for the adoption of next-generation technologies. Students can apply their book-learning to a real environment.

They can design networks with topology elements such as routers, switches, cable connectivity etc. Having the expertise to create and maintain a small to medium network is crucial for passing the exam.



- **Network Design**

Network administrators use packet tracer to test “what if” scenario in networks that will help them in designing a network. They can create a topology guide with it. They prefer doing it because it allows editing of the features without erasing anything or beginning from scratch.

- **Testing Modifications**

The professional network administrators can use Cisco Packet Tracer to test network changes before applying them to the actual network.

Before modifying a network, the user can check out the new topology to decipher if everything is in order. Once it is final and there aren't any flaws, they can apply the changes in a real network.

How to download Cisco Packet Tracer?

Cisco Packet Tracer is a free tool for the members of the Cisco Networking Academy. Those who aren't members of this academy have to enroll in one of their Packet Tracer courses. Once done, you can download the Tracer using the following steps:

1. Click the "Enroll to Download Packet Tracer" button
2. Sign up in the introduction to Packet Tracer course
3. Finish up your registration in the Network Academy
4. Launch the "Introduction to Packet Tracer" course
5. Install instructions available in the course

Key Features

- **Packet Tracer Modes**

Cisco Packet Tracer offers two operating modes to envision the network behavior:

1. Real-time Mode – Network behaves like real devices. It gives an immediate, real-time response to all network activities.
2. Simulation Mode – The user can watch and control time intervals. They can view the inside operation of data transfer and delivery of data across the networks.

- **Packet Tracer Workspaces**

Cisco Packet Tracer has two workspaces:

1. Logical – Users can create a logical network topology by connecting and clustering the virtual network devices.

2.Physical – Provides an illustrious physical side of the logical network. It helps to fathom a sense of placement and scale of devices like a router in real-time.

- **Activity Wizard**

The Activity Wizard enables a user to design their learning activities. They can do so by creating scenarios using instructional text. And eventually, they can develop the first and final network topology as well as predesigned packets. This *Wizard* also offers feedback and grading skills.

- **Multiuser Functionality**

Cisco Packet Tracer is a network-capable application. It has a multiuser peer-to-peer mode to enable the collaborative construction of digital networks on the real systems. This multiuser feature facilitates incredible competitive interactions and collaborations. People can use it for social interactions, gaming, and learning.

- **Tutorials**

Packet Tracer contains a handful of basic step-wise tutorials to teach users about the product features. They clarify how to engage in the simulations. For an in-depth study, there are advance tutorials available on the Academy connection.

Limitations

The application itself has only a handful of features available inside the actual hardware that runs the Cisco IOS version. It is not suitable for modeling production networks. It has limited command sets, making it impossible to practice all IOS commands required.

It is only a learning aid, not a replacement for actual switches or routers, as explained earlier.

Verdict

Packet Tracer can be hard to grasp as a beginner. Yet, the more time you spend on it, the more expert you become at troubleshooting and running network simulations.

It is essential to familiarize yourself with a tool like Cisco Packet Tracer. It is an intermediary step when preparing to monitor an enterprise-grade network. For many administrators of this network, Cisco Packet Tracer is a useful learning tool.

As you configure a router in the Packet Tracer, it puts you on the path of becoming a highly competent and resilient network administrator. When you aim for a level of expertise, it is better to start with a limited topology and gradually move on to broader networks.

If you have any queries or confusions, leave your comments below!

CHAPTER 6

SYSTEM DESIGN

6.1 INTRODUCTION

Based on the user requirements and the thorough analysis of a new system, the new system must be designed. This is the stage of system designing. It is the most critical phase in the development of a system. The rational system design arrived at as a result of system analysis and is transformed into physical system design. In the design phase the SDLC procedure continues to move from the questions of the analysis phase to the how. The logical design shaped during the analysis is revolved into a physical design - a detailed description of what is required to solve original problem. Input, output, codification schemes databases, forms and processing specifications are drawn up in detail. In the design stage, the language to be used for programming and the hardware and software platform in which the new system will run are also decided. There are several tools and methods used for describing the system design of the system.

6.2 INPUT DESIGN

Input design is the process of converting user-originate inputs to a computer-based format. The goal of design input data is to make data as easy, logical and free. The most common source of data processing errors is inactive input data. Effective design of the input data minimizes the error made by data entry operators. Catching errors on input is far less costly than correcting after data storage is complete.

- It should serve specific purpose effectively such as storing, recording, and retrieving the information.
- It ensures proper completion with accuracy.
- It should be easy to fill and straightforward.
- It should focus on user's attention, consistency, and simplicity.

6.3 OUTPUT DESIGN

Output design has been an ongoing activity from the very beginning of the project. The objective of the output design is to convey the information of all past activities, current status and to emphasize important events. The output generally refers to the results and information that is generated from the system.

The output design of the system is accomplished keeping in mind the following activities:

- To develop output design that serves the intended purpose and eliminates the production of unwanted output.
- To develop the output design that meets the end users requirements
- .To delivers the appropriate quantity of output.
- To form the output in appropriate format and direct it to the right person.
- To make the output available on time for making good decisions.

CHAPTER 7

METHODOLOGY

7.1 FRAME WORK

Cisco Packet Tracer designed to be used as multi-tasking, that's been wont to organize and examine varied network exercises like application of dissimilar topologies, development of apt servers, sub netting and study of different network setups, configuration and different troubleshooting defined commands. To initialize communication among two networking devices i.e., user networking devices and to organize a network, we intend to demand to pick applicable networking devices like routers hubs, switches or interconnecting devices and build physical change of integrity by connecting cables, quick local area network seaports from the module list of packet tracer[4]. Internetworking devices square measure costly and thus it's well to perform 1st on the packet tracer to recognize the conception, performance of the prescribed network.

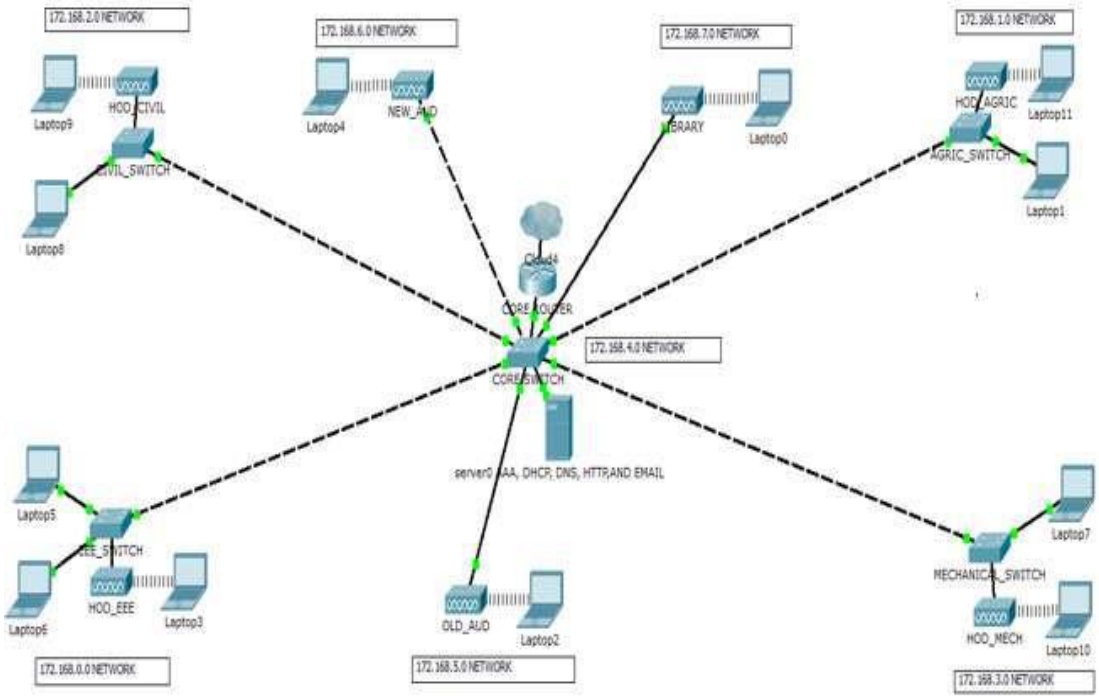


Figure 3.1 Frame Work

The graph of Fig. 3.1 is the finished graph of the LAN and at the center it connected to switch, switch and the servers framing the Network Operating Center and every one of the different departments in College are only a simple expansion of the system at the center.

The allotted IP address picked to the inside system is 192.168.0.0 and it has been sub netted to acquire IP address obstructs that are allocated to various divisions and segments of this prescribed LAN.

7.2 CREATE AND ASSIGN IP/SUBNET MASK FOR VLANS

In this VLAN, we are assigning the default gate ways to all the VLANs with ip address and subnet mask.

Which is configured in the main switch of VLAN?

#ena

#config t

#VLAN 2

#VLAN 3

#int VLAN 1

#ip address 192.168.1.1(Network ID) 255.255.255.0 (Host ID)

#int VLAN 2

#ip address 192.168.2.1(Network ID) 255.255.255.0 (Host ID)

#int VLAN 3

#ip address 192.168.3.1(Network ID) 255.255.255.0 (Host ID)

#int VLAN 4

#ip address 192.168.4.1(Network ID) 255.255.255.0 (Host ID)

#int VLAN 5

#ip address 192.168.5.1(Network ID) 255.255.255.0 (Host ID)

#int VLAN 6

#ip address 192.168.6.1(Network ID) 255.255.255.0 (Host ID)

#int VLAN 7

#ip address 192.168.7.1(Network ID) 255.255.255.0 (Host ID)

#int VLAN 8

#ip address 192.168.8.1(Network ID) 255.255.255.0 (Host ID)

7.3 CONFIGURE DHCP SERVER

In this DHCP server, we must give the IP address, DNS server and subnet mask .After that we must go to the DHCP we assign the default gateway and DNS server address by give name to different address and add one by one to server.

7.4 CONFIGURE MODE ACCESS/TRUNK IN VLANS:

The configuration is done between the main switch and the primary switches of VLANs by using the cable interface we can trunk all the switches.

#int fa0/2

#switch port trunk encapsulation dot1q

#switch port mode trunk

In the primary switch, the interface cable are connect to the laptop and access point. Swhich is used to trunk to the PC and access point.

#int fa1/1

#switch port mode access

#switch port access VLAN 2

7.5 TELL PC IN VLANS WHERE TO GET IP:

In this VLANs, the switch of different VLAN are getting there IP address from server.

#int VLAN 1

#ip helper-address 192.168.10.2

#int VLAN 2

#ip helper-address 192.168.10.2

CHAPTER 8

SYSTEM TESTING

Testing is a process of checking whether the developed system is working according to the original objectives and requirements.

Testing is a set of activities that can be planned in advance and conducted systematically. Testing is vital to the success of the system. System testing makes a logical assumption that if all the parts of the system are correct, the global will be successfully achieved. In adequate testing if not testing leads to errors that may not appear even many months. This creates two problems,

- The time lag between the cause and the appearance of the problem.
- The effect of the system errors on the files and records within the system.

A small system error can conceivably explode into a much larger

Problem. Effective testing early in the purpose translates directly into long term cost savings from a reduced number of errors. Another reason for system testing is its utility, as a user-oriented vehicle before implementation. The best programs are worthless if it produces the correct outputs. No other test can be more crucial. Following this step, a variety of tests are conducted.

- Unit testing
- Integration testing
- Validation testing

8.1 UNIT TESTING

A program represents the logical elements of a system. For a program to run satisfactorily, it must compile and test data correctly and tie in properly with other programs. Achieving an error free program is the responsibility of the programmer. Program testing checks for two types of errors: syntax and logical. Syntax error is a program statement that violates one or more rules of the language in which it is written. An improperly defined field dimension or omitted keywords are common syntax errors. These

errors are shown through error message generated by the computer. For Logic errors the programmer must examine the output carefully.

When a program is tested, the actual output is compared with the expected output. When there is a discrepancy the sequence of instructions must be traced to determine the problem. The process is facilitated by breaking the program into self-contained portions, each of which can be checked at certain key points .The idea is to compare program values against desk-calculated values to isolate the problems.

Test case no	**Description**	**Expected result**
1	Test for all modules	All modules should communicate in the group.
2	Test for various functions in a the framework.	The result after execution should give the accurate result.

Table 8.1 Test cases for Unit Testing

8.2 FUNCTIONAL TESTING

Functional testing of an application is used to prove the application delivers correct results, using enough inputs to give an adequate level of confidence that will work correctly for all sets of inputs. The functional testing will need to prove that the application works for each client type and that personalization function work correctly.

Test case no	Description	Expected result
1	Test for application window properties	All the properties of the windows are to be properly aligned and displayed
2	Test for mouse operations	All the mouse operations like click, drag, etc. must perform the necessary operations without any exceptions

Table 8.2 Test cases for Functional Testing

8.3 NON-FUNCTIONAL TESTING

This testing used to check that an application will work in the operational environment.

Non-functional testing includes:

- Load testing
- Performance testing
- Usability testing
- Reliability testing
- Security testing

8.3.1 LOAD TESTING

Test case no	Description	Expected result
1	It is necessary to ascertain that the application behaves correctly under loads under various execution	Should designate another active process.

Table 8.3.1 Test cases for Load Testing

8.3.2 PERFORMANCE TESTING

Test case no	Description	Expected result
1	This is required to assure that an application perforce adequately, having the capability to handle many results in expected time and using an acceptable level of resource and it is an aspect of operational management.	Should handle large input values, and produce accurate result in a expected time

Table 8.3.2 Test cases for Performance Testing

8.3.3 RELIABILITY TESTING

Test case no	Description	Expected result
1	This is to check that the system is rugged and reliable and can handle the failure of any of the components involved in provide the application.	In case of failure error catch function should take over the execution

Table 8.3.3 Test cases for Reliability Testing

8.3.4 WHITE BOX TESTING

White box testing, sometimes called glass-box testing is a test case design method that uses the control structure of the procedural design to derive test cases.

Using white box testing method, the software engineer can derive test cases.

Test case no	Description	Expected result
1	Exercise all logical decisions on their true and false sides	All the logical decisions must be valid
2	Execute all loops at their boundaries and within their operational bounds.	All the loops must be finite
3	Exercise internal data structures to ensure their validity.	All the data structures must be valid

Table 8.3.4 Test cases for White box Testing

8.3.5 BLACK BOX TESTING

Black box testing, also called behavioral testing, focuses on the functional requirements of the software. That is, black testing enables the software engineer to derive sets of input conditions that will fully exercise all functional requirements for a program. Black box testing is not alternative to white box techniques. Rather it is a complementary approach that is likely to uncover a different class of errors than white box methods. Black box testing attempts to find errors in the following categories.

Test case no	Description	Expected result
1	To check for incorrect or missing functions	All the functions must be valid
2	To check for interface errors	All the interface must function normally
3	To check for errors in a data structures or external data base access.	The database updation and retrieval must be done

Table 8.3.5 Test Cases for Black box Testing

CHAPTER 9

SYSTEM IMPLEMENTION

9.1 INTRODUCTION

Cisco Packet Tracer has two modes namely Physical mode and Logical mode. This Packet Tracer is a developed by the Cisco for virtual design of network architectures and the topologies this tool allows all the users to create their own network designs and simulate according to present world computer networks. This software permits all users to use a graphical command line interface to run the setup of Cisco routers and devices. It is a drag drop interface which includes configuring IP address of routers, switches, PC and many more. In this we can configure switches in two different ways. Firstly, by writing some commands in CLI which is Command Line Interface and the other way is by giving IP address to the external devices which are connected for the switch. As Packet Tracer is flexible it allows users to add or it allow user to remove virtual network devices.

9.2 USER INTERFACE

The monitor will be shown in the city's digital topology.

- The Cisco Packet Tracer [5][7] network emulator is easy to implement and provides a clear appeal to the graphical user interface.
- Five switches will be shown; separate VLANs and 1 router will be connected to the VWAN.
- The interface of the command line (CLI) will allow you to adjust it or customize it

9.3 PERSONAL FIREWALLS

Personal firewall software should be deployed on each and every laptop. Ideally, these software firewalls will function within a centrally controlled system that can enforce usage with and is compatible with your hardware firewalls. All laptops with a wireless NIC must have a personal firewall installed that supports connection-specific policies. As laptops are often outside the protection of the school or district firewall, every laptop should have a personal firewall installed. This will be critical for students taking their laptops home and then returning, with potential infections, to the school WLAN. The firewall built into Vista may provide sufficient baseline security for student laptop use, although software client

licenses compatible with your firewall solution at either the school site or district head office is better. What is built into Windows XP is not sufficient. The personal firewall should be configured to block split tunneling and any ad hoc WLAN connections.

9.4 NETWORK ACTIVE CHECKING TEST (PING)

Network communications and network connectivity will be verified with the help of ping commands, tracked by the domain significant name of the device one wishes to check connectivity with. Two proposed VLAN models, have been additional to the prescribed network and the ping test was accomplished to test if the devices are linked to those VLANs are in contact with the other devices in the network.

9.5 ROUTER CONFIGURATION

The IP address should be given to router in config option, as see in the diagram those configurations should be considered according to the interface. Router to Router connection is another impactful thing which should be taken into consideration and in serial ports we can configure the connection to the routers.

9.6 SYSTEM CONFIGURATION

In system configuration the ip address is assigned to the system and the router address is filled in the gateway address to establish the connection between the router and the system.

CHAPTER 10

CONCLUSION

In our article, a Local Area Network that utilizations both wired and remote topology have been executed with some significant ideas like Dynamic Host Configuration Protocol, Domain Name System, Email, and Virtual LANs in a solitary system in Cisco Packet Tracer. Virtual Local Area Networks have been utilized to intelligently amass customers on the system, and with the guide of a switch and switch setups, information bundles directed starting with one gadget then onto the next. It is likewise important that, the design and particulars are for the underlying model and can further be created and extra usefulness can be added to expand backing and inclusion.

CHAPTER 11

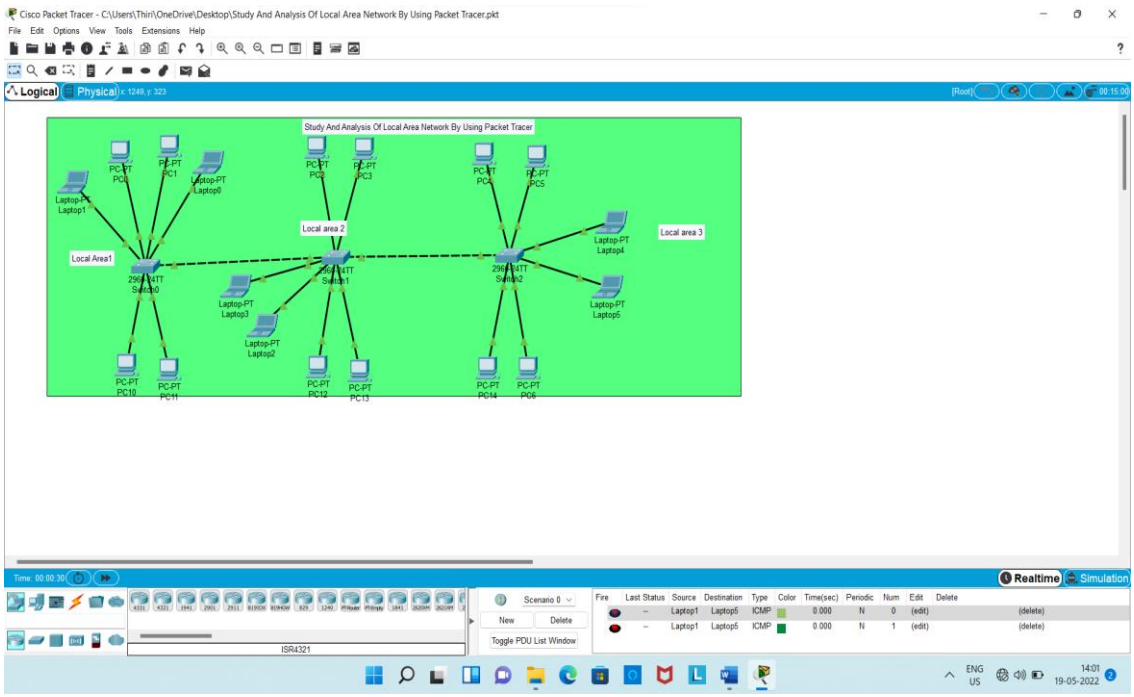
FUTURE ENHANCEMENT

- We further art the organization thickness capacity to accommodate the necessities of adjusted vitality utilization and solid sensor hub network.
- The methods proposed in this proposition fill the clear of accessible writing and can fill in as rules for WSN planners, arrangement suppliers and framework integrators of WSN applications.

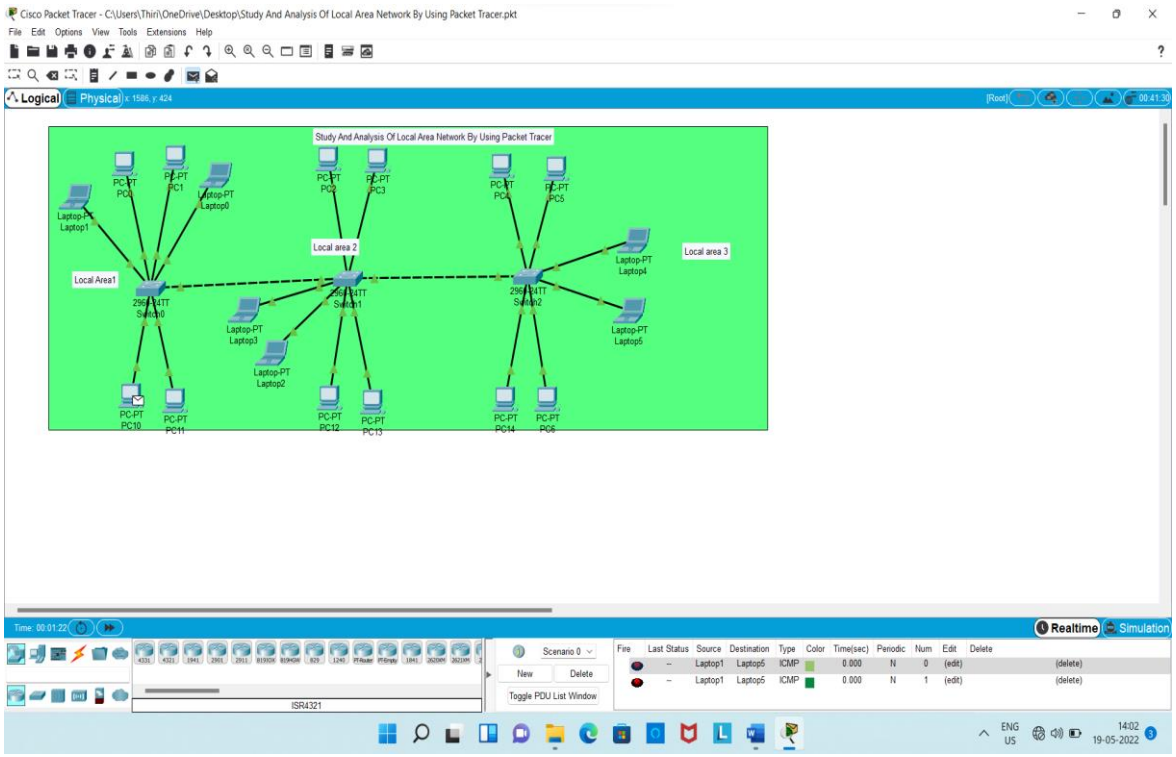
APPENDIX-I

SCREENSHOTS

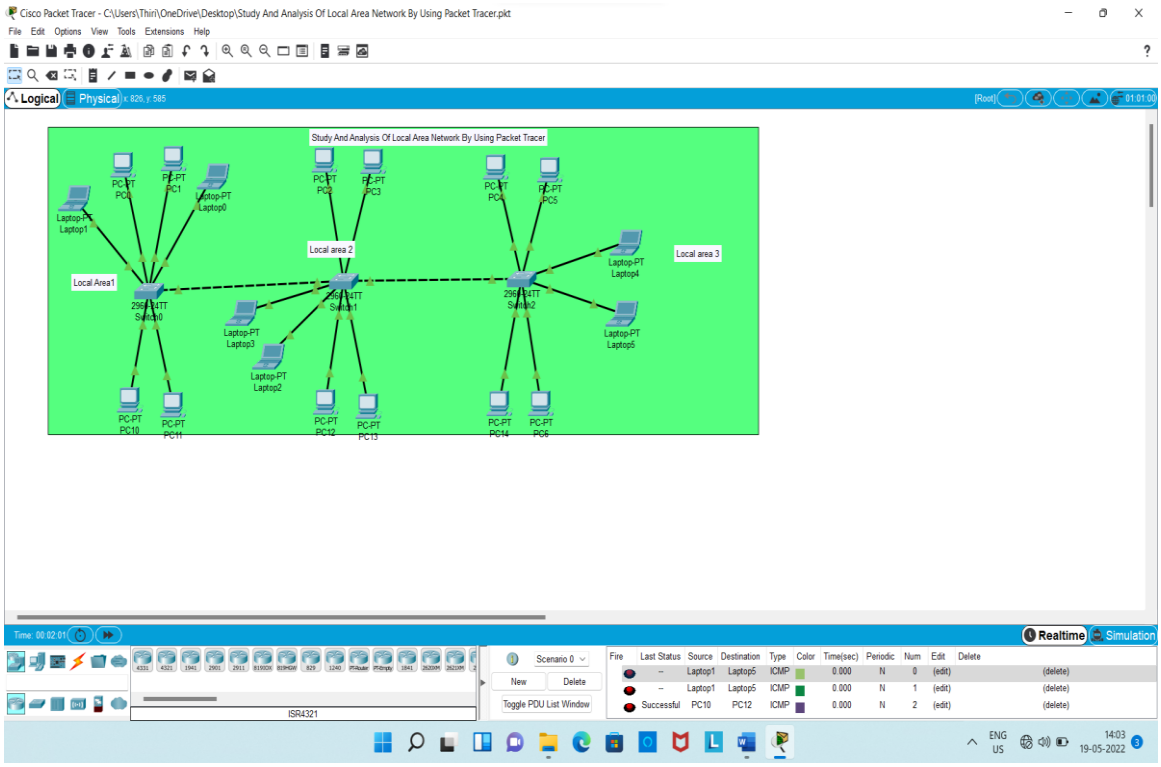
Study And Analysis Of Local Area Network:



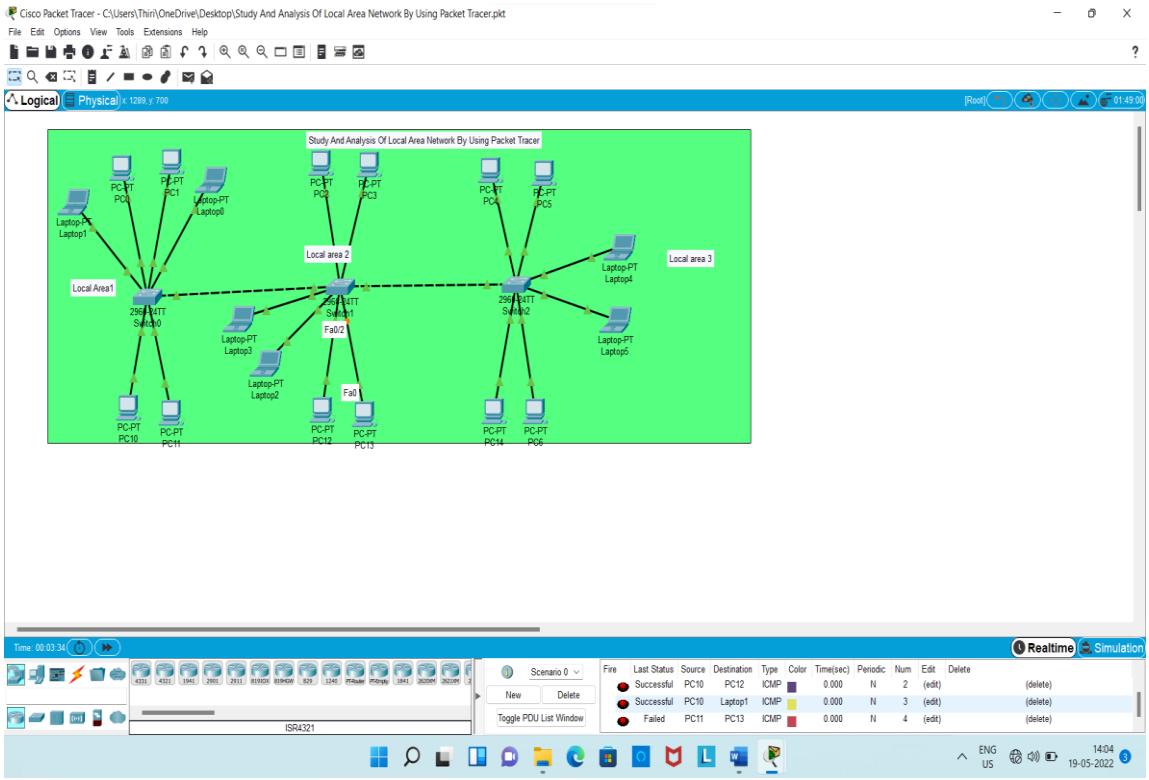
Selecting Message Box To Send Message:



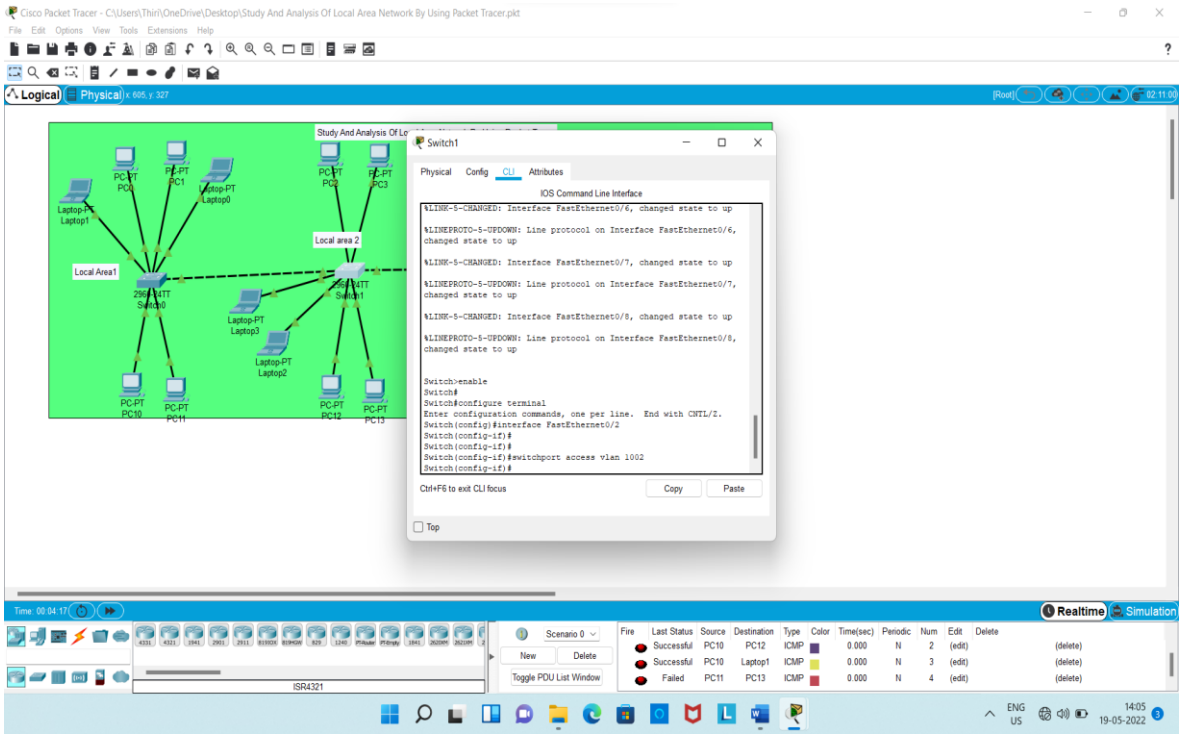
Message Sent Successfully To The Client:



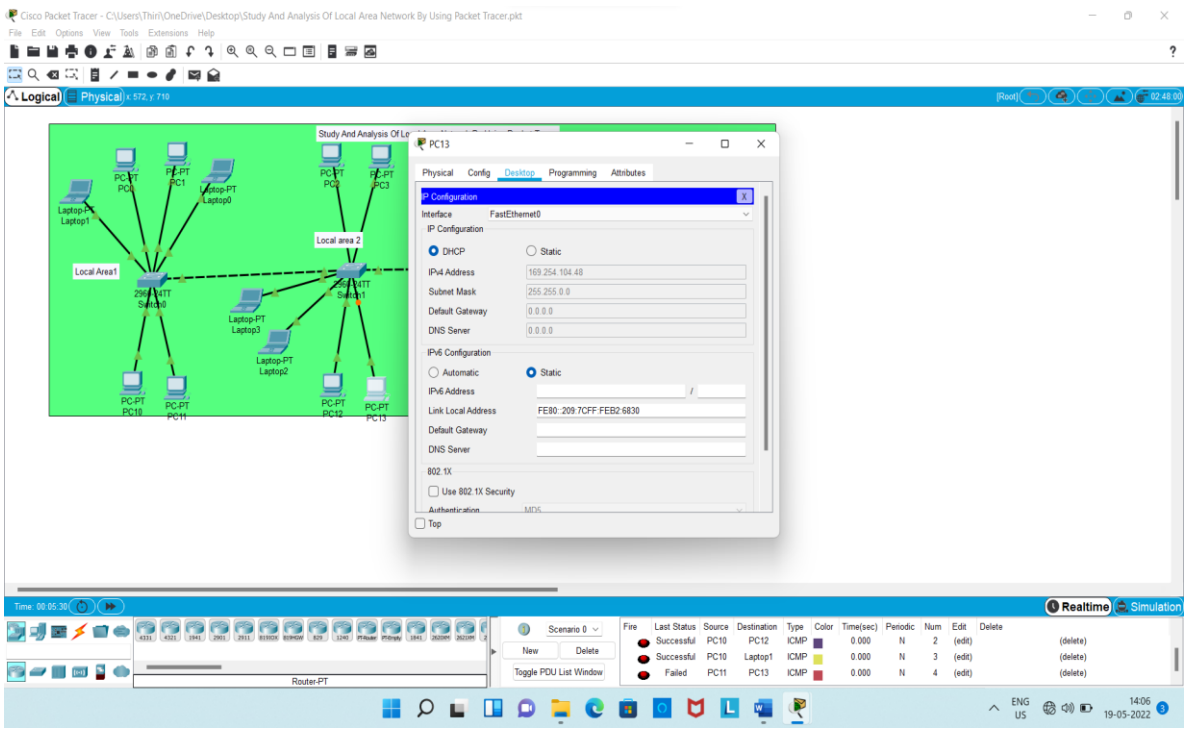
Message Sent To The Blocked Client Was Failed:



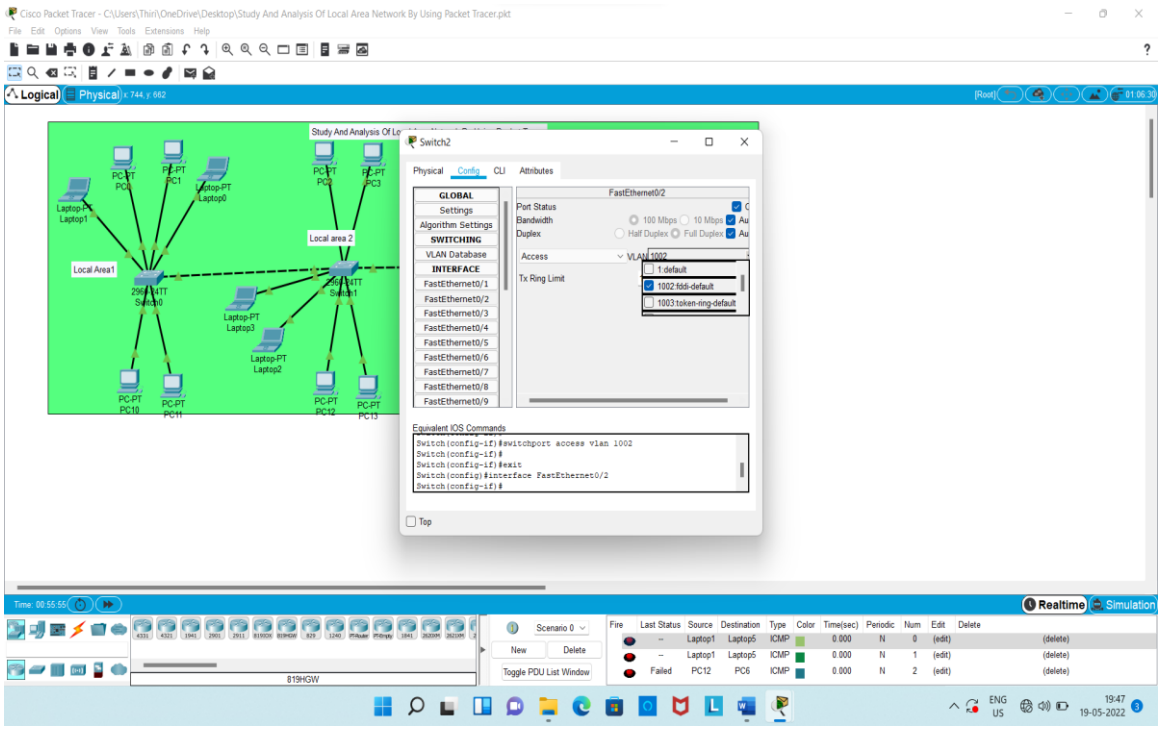
Code For The Switch:



Assigning Ip Address to the PC:



Step For Blocking The Unwanted Client:



APPENDIX II

SOURCE CODE

SWITCH 0

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to up

Switch>enable

Switch#sh

Switch#show r

Switch#show running-config

Building configuration...

```
Current configuration : 1104 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Switch
!
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
switchport mode access
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
```

```
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
no ip address
shutdown
!
!
!
!
line con 0
!
line vty 0 4
login
line vty 5 15
login
!
!
!
!
end

Switch#
```

SWITCH 1

```
Switch>enable
Switch#show running config
^
% Invalid input detected at '^' marker.
```

```
Switch#show run
Switch#show running-config
Building configuration...

Current configuration : 1080 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Switch
!
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
--More--

Switch con0 is now available

Press RETURN to get started.

Switch>enable
Switch#show r
Switch#show running-config
Building configuration...

Current configuration : 1080 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Switch
!
!
!
!
!
!
```

```
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
```

```
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
no ip address
shutdown
!
!
!
!
line con 0
!
line vty 0 4
login
line vty 5 15
login
!
!
!
!
end


Switch#
```

SWITCH 2

```
Switch>enable
Switch#show run
Switch#show running-config
Building configuration...

Current configuration : 1080 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Switch
!
!
!
!
!
!
spanning-tree mode pvst
```

```
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
```

```
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
no ip address
shutdown
!
!
!
!
line con 0
!
line vty 0 4
login
line vty 5 15
login
!
!
!
!
end

Switch#
```

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