

# **Implementation of College Network Scenario Module Using Multiple VLANs and Single DHCP Server**

Project report submitted in partial fulfillment of the requirement for the  
degree of Bachelor of Technology

in  
**Computer Science and Engineering**  
By

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Under the supervision of

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to



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## **Candidate's Declaration**

I hereby declare that the work presented in this report entitled “**Implementation of College Network Scenario Module Using Multiple VLANs and Single DHCP Server**” in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology in Computer Science and Engineering/Information Technology** submitted in the department of Computer Science & Engineering and Information Technology, Jaypee University of Information Technology, Waknaghat is an authentic record of my own work carried out over a period from August 2017 to May 2018 under the supervision of **(BRIG(RETD.) Dr. SP Ghrrera)** (HOD of computer science department).

The matter embodied in the report has not been submitted for the award of any other degree or diploma.

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This is to certify that the above statement made by the candidate is true to the best of my knowledge.

**Dr. Satya Prakash Ghrrera**  
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**Dated:**

## **ACKNOWLEDGEMENT**

We owe our profound gratitude to our project supervisor Dr. (BRIG) RETD. **SP Ghrera**(Head, Dept. of CSE and IT), who took keen interest and guided us all along in my project work titled — **Implementation of College Network Scenario Module Using Multiple VLANs and Single DHCP Server**, till the completion of our project by providing all the necessary information for developing the project. The project development helped us in research and we got to know a lot of new things in our domain. We are really thankful to him.

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## **ABSTRACT**

There are diverse clients of the venture; essentially the clients are available at better places in various gatherings. By this, a demand is produced by one client of either to speak with other client or clients or offering a few information to them. There can be where a message is to be communicated by a client to whole school. So this task is about correspondence among various clients introduce at various areas, sharing this regular system. CNS Stands for the college network scenario

# CHAPTER – 1

## Introduction

### **1.1: Introduction of CNS**

The CNS is tied in with outlining a topology of a system that is a LAN(Local Area Network) for a College in which diverse PCs of various offices are orchestrated so that can convey and associate with each other by trading information. To outline a systems administration situation for a school which associate diverse divisions to each other? It gives correspondence among various offices. CNS is utilized to plan an effective topology, satisfying every one of the necessities of the school (that is customer). CNS furnishes a system with great execution. CNS is additionally giving security and verification to restrict unapproved logins.

There are distinctive clients of the venture; fundamentally the clients are available at better places in various gatherings. By this, a demand is created by one client of either to speak with other client or clients or imparting a few information to them. There can be where a message is to be communicated by a client to whole school. So it is about correspondence among various clients display at various areas, sharing this regular system. CNS Stands for the college network scenario.

## **1.2 Problem Statement**

This work about CNS (College's Networking Scenario) is to give an effective, protected, confirmed, solid correspondence among various offices. The work is fabricate remembering the cost and intricacy factor. With various divisions can undoubtedly share the coveted information with no issue and can trade their information without going physically to them simply like a telephone call, subsequently sparing time and vitality.

Every one of the divisions are characterized into various VLANs, which are associated with the four changes as indicated by the succession in which they are obliged on floor. For e.g. on ground floor there is division called administrator for organization office of school and that is a VLAN administrator is associated with change allocated to ground floor?

The issue is to grow most needy, solid and productive topology coordinate with confirmation, in order to limit our cost and many-sided quality.

### **1.3: Objectives**

1. Above all else the general topology depends on tree topology which will helpfully serving the system
2. The system depends on customer server engineering.
3. Essentially there are four customer switches which are working for the four stories of school and they are associated with a server switch.
4. Every one of the divisions ought to be ordered into various VLANs, which will be associated with the four changes as per the arrangement in which they are obliged on floor. For e.g. on ground floor there is division called administrator for organization office of school and that is a VLAN administrator is associated with change relegated to ground floor?
5. Additionally, unique divisions ought to be bound into VLANs and offer changes individual to their floors.
6. Presently when any demand is made by any arrangement of any office it ought to be sent to customer switch which additionally advances it to the server.
7. There will be port-securities which are actualized on various port of the switches which gives security from unapproved work force from interfacing with the switch.
8. After the server, the information is exchanged to the switch associated with it.

9. Switch essentially courses the information to the coveted goal and furthermore fills in as DHCP server for allocating IPs to the host PCs.

10. One of the energizing highlights of this task is that each gadget that is whether it's a switch or a switch, they have been under the security of their separate passwords which are just known to the manager (organize chairman).

11. He/she can reset the secret key whenever.

## **1.4 Methodology**

Our task depends on waterfall show. In this we have gone well ordered through the procedure. To begin with we have experienced our writing review, at that point we got things applicable to our prerequisite of the undertaking for executing the school organize situation. We executed the venture checked alongside various parameters and circumstance.

The essential engineering of CNS utilizes fundamentally extraordinary kinds of VLAN associations, different PCs, Switches, Server, Router, Laptops and individual PC's.

The innovation is utilized for interfacing diverse gadgets like switches, switches, and distinctive end gadgets to speak with each other and trading information. To assemble a productive and dependable system, is adaptable as well.

Cisco Certified Network Associate CCNA is a prevalent accreditation in PC organizing created by Cisco Systems. CCNA is found by the Cisco, to perceive essential competency in establishment and support of medium-sized systems.

Innovation Used:

- EIGRP ( Enhanced Interior Gateway Routing Protocol )
- OSPF ( Open Shortest Path First )
- RIP ( Routing Information Protocol )
- TELNET
- VOIP ( Voice Over Internet Protocol )
- BGP ( Border Gateway Protocol )

### **1.5 : Motivation for the Project**

CCNA furnished us with the stage to actualize our insight, outline and execute the system for a school which has different clients who will undoubtedly get diverse benefits. Security and proficiency are our greatest point and destinations.

As the title of the task recommends "To Implement College Network Scenario utilizing Multiple VLAN utilizing Single DHCP Server". CISCO Packet Tracer furnished us with the stage to actualize situation since Routers and Network, in actuality, require tremendous venture, so execute such situation in Stimulator encourages us to comprehend

## **CHAPTER 2**

### **Literature Survey**

The college will utilize private IP address 192.168.0.0/16 inside LAN and they will utilize (NAT) or (PAT) to access outside system.

#### **1. Role of Packet Tracer in learning Computer Networks (Raashid Javid,2014)**

Raashid Javid's paper relates the part of a packet tracer in learning PC systems. As PC systems have expanded in number and size, besides PC systems are utilized wherever on account of different advantages of PC systems, similar to document sharing, printer sharing, web association sharing, multi-player gaming, web telephone utilities, stimulation and so on, therefore it is critical to comprehend the fundamental ideas of PC systems. This paper starts with a prologue to packet tracer, and its points of interest to learn different ideas of PC systems adequately and productively.

It is an open-source programming which can be downloaded free of cost from the web. Packet tracer likewise comprehends the idea of coherent investigating and it can likewise be utilized for contextual analyses. There are incorporated instructional exercises alongside the product to comprehend utilization of different highlights of packet tracer. It additionally underpins gathering and individual labs, homework, exams, diversions, critical thinking and so on.

Workspaces: There are two sorts of work space

Consistent Work-space: It enables clients to assemble sensible system topologies and different gadgets can be moved to legitimate workspace.

Physical work-space: It enables a client to make a system, the route as it would look in genuine, and has the ability of geographical portrayal, where diverse systems administration gadgets can be appeared as associated at changed areas of the city.

Modes: There are two composed Modes



Continuous Mode: The gadgets in a system act as genuine gadgets do and appear to be like genuine gadgets.

Reenactment Mode: In this mode, an understudy can see and control time interims, to figure out how to investigate organize disappointments.

DEVICES	CABLE
Pc to Pc	Cross-Over Cable
Pc to Router	Cross-Over Cable
Pc to Switch	Straight Cable
Switch to Router	Straight Cable
Router to Router	Serial Cable

Types of cables to connect PC, Switch & Router

**Table-1**

MODE	SYMBOL
User Mode	Router>
Privilege Mode	Router#
Global Configuration Mode	Router(config)#
Interface Configuration Mode	Router(config-if)#
Line Configuration Mode	Router(config-line)#

Basic Modes of a Router

**Table-2**

Packet tracer has parcel of highlights to make different situation based labs. Understudies are especially intrigued to learn PC systems and in the wake of accomplishing more practice on a bundle tracer, they pick up parcel of certainty to chip away at ongoing systems administration gadgets. Actually, an understudy can't bear to purchase genuine gear, in view of the cost.

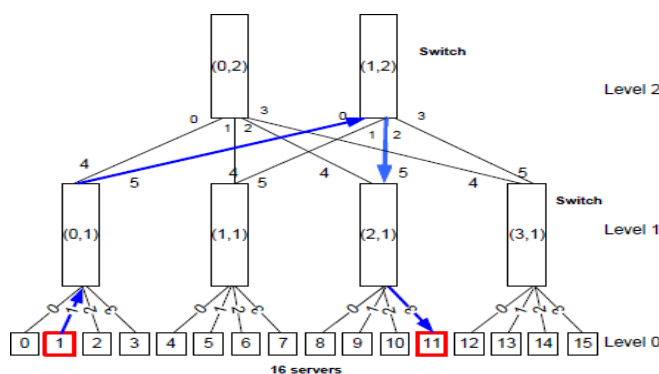
## 2. Using Simulation and Modelling Tools in Teaching Computer Network Course (M. Sllame , Jafaray,2014)

Sllame and Jafaray's paper depicts the advantage of utilizing displaying and reenactment instruments to help instructive process in showing PC arrange engineers. These methods inspire understudies and urge them to be unique and inventive. The got comes about are promising to lessen the hole between the training in colleges and genuine workplaces. This thus makes understudies arranged to confront genuine issue amid their future genuine employments. Parcel tracer, GNS2, OPNET, and fat-tree test system apparatuses are utilized as a part of this paper.

Configuration ventures have been utilized as intends to move and incorporate learning in numerous courses of data innovation and designing. Besides, venture based learning is considered as a noteworthy development in outline instructional method. In this way, venture based courses are utilized as assets to improve understudies' designing reasoning and it brings about planning future specialists with enough experience and makes them ready to handle certifiable issues as required in their future calling. Brereton in considered how building understudies learn and create designing instinct by constantly moving their reasoning worldview from designing hypothesis to communication with equipment.

It is seen that undertaking based learning approach when connected in low levels of IT and designing projects do:

- Enhances' understudies enthusiasm for IT and building as fields of study;
- Motivates' understudies in adapting more upper levels of IT and designing fields' propelled programs;
- Enriches' understudies capacity and inventive reasoning to tackle more complex true issues;
- Make understudies ready to work in groups, convey, sort out, and trade thoughts.



Packet's path flow from server (1) to server (11) in fat tree simulator **Fig-1**

### Data centers networking

Current server farms may contain a large number of PCs with gigantic amassed data transfer capacity prerequisites. One of the normal system engineering comprises of a tree of directing and exchanging components with dynamically more specific and costly hardware climbing the system progressive system [8]. For this situation, we utilize the test

system created by the creator gathering and portrayed in The test system depicts a fat tree construct Network-with respect to Chip (NOC) framework, in any case, here it is adjusted for organize examination purposes and to indicate point by point choices amid exchanging and directing. Switches utilize wormhole steering with virtual channel system. The switch comprises of the accompanying units: switch, input/output interface controllers and intervention units. Be that as it may, the test system is utilized here to examination the availability, exchanging and steering procedures utilized as a part of server farm' servers 'cultivate.

The test system shows some valuable parameters amid the reenactment procedure, for example, number of servers that are utilized as a part of the middle structure, crossed switches, and virtual channels/physical channels and the status of buffering inside the switches. Toward the end, the framework figures message dormancy, and system throughput.

### **3. Comparative Study of Various Routing Protocols(P.S Sandhu, K.S Bhatia and H.Kaur,2013)**

With expanding interest of information on systems .we require greatest usage of data transmission. Different conventions are intended to limit wastage of data transfer capacity. Here we have examined about examination of different switch conventions with help of OPNET to repay in wastage of transmission capacity .Four conventions RIP, EIGRP, IGRP and OSPF are utilized for correlation. We watched two elements THROUGHPUT and QUEUING DELAY on the two finishes transmitter and recipient.

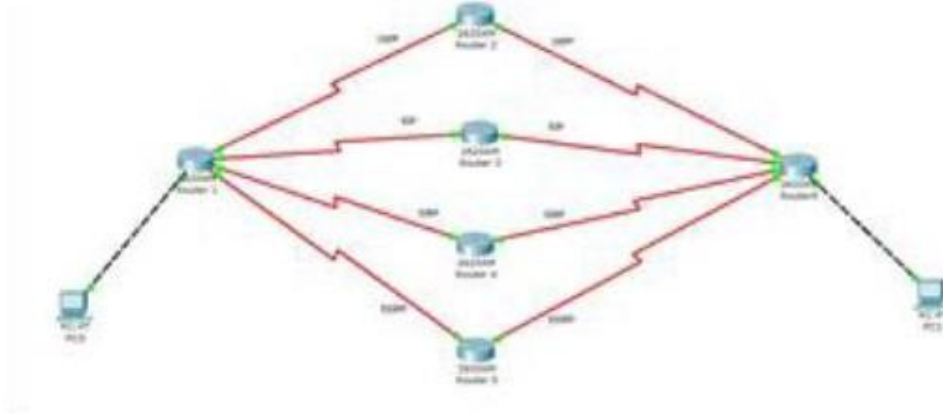
Keywords- Enhanced Interior gateway routing protocol (IGRP)

Interior gateway routing protocol (IGRP),

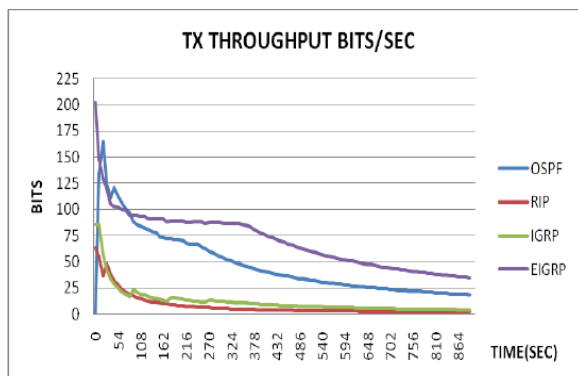
Open shortest path first (OSPF)

Router information protocols (RIP).

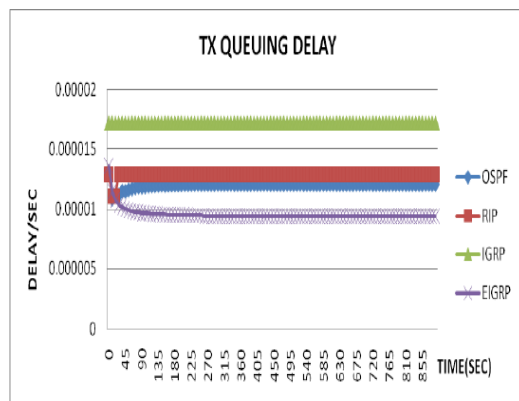
### **EXPERIMENT**



**Fig-2**



**Graph-1**



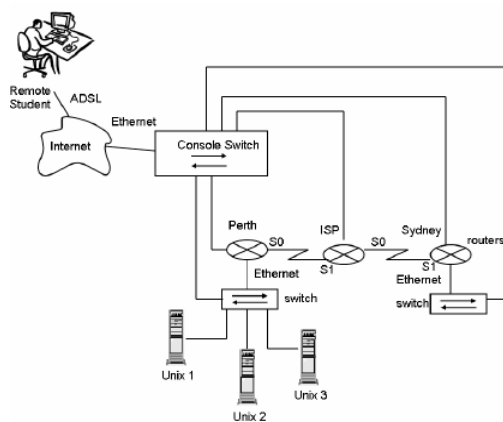
**Graph-2**

**4. Remote and Local Delivery of Cisco Education for the Vision-Impaired (H.Armstrong and I.Murray,2007)**

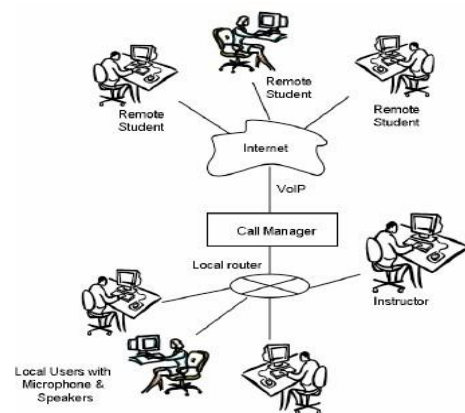
Vision-weakened understudies confront enormous snags in their mission to get to learning materials conveyed in online and other electronic configurations. The power of visual prompts, utilization of blaze and liveliness and the failure of screen perusing applications to decipher pictures all add to make a big deal about the present e-learning materials

related with figuring things out unavailable by visually impaired or vision-disabled understudies.

The points of the present task are to create answers for enhance openness of the Cisco e-learning materials, give availability to both nearby and remote understudies, and build up a situation that can be freely kept up by one of the undertaking accomplices, the Association for the Blind (WA). An overall objective is to expand the employability of the members on culmination of the courses, giving them industry standard capabilities significant to the commercial center.



**Fig-3**

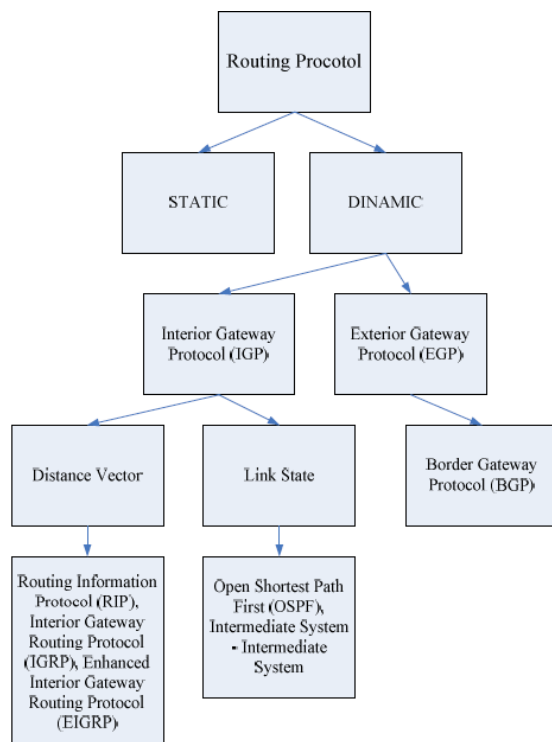


**Fig-4**

The utilization of VoIP has given a road to remote understudies to take part in addresses and lab works out. Devices, for example, the iNetSim organize test system permit the vision hindered understudies to get to parts of the educational programs not already available. The vision debilitated understudies are told by correspondingly incapacitated teachers who comprehend their challenges and give smart arrangements. At show the Cisco Academy for the Vision Impaired is arranged inside the college, be that as it may, throughout the following year it will be physically moved to the premises of the Association for the Blind (WA). The visually impaired educators will move with the foundation and keep on teaching new admissions of vision disabled understudies gave keeping financing can be gotten for future tasks.

## **5. Performance Analysis of Dynamic Routing Protocol EIGRP and OSPF in IPv4 and IPv6 Network(C Wijaya,2011)**

C Wijaya's examination will mirror some framework topology and shows that EIGRP are unfathomably upgraded than OSPF in a broad assortment of topology. The social affair of coordinating convention is laid out underneath. Where there are some compelling controlling convention can be familiar with arranging organizing tables in the switch. There is Interior Gateway Protocol (IGP) than ought to be utilized for the switches in same space structure, for example, Routing Information Protocol (RIP), Enhanced Interior Gateway Routing Protocol (EIGRP), Open Shortest Path First (OSPF) and IS-IS (Intermediate System – Intermediate System). In like manner, for the switches in various zone sort out, Exterior Gateway Protocol (EGP) can be utilized, for example, Border Gateway Protocol (BGP).



**Fig-5**

Measurements in EIGRP is controlled by figuring data transmission, unwavering quality, postponement and load for each connection associated with the switch. The creation measurements are indicated where  $K1 = 1$ ,  $K2 = 0$ ,  $K3 = 1$ ,  $K4 = 0$ , and  $K5 = 0$ .

OSPF has five diverse parcel write. Every bundle has a particular reason in OSPF process. The following is OSPF bundle writes:

1. Hi parcel
2. Database depiction

3. Connection state ask for parcel
4. Connection state refresh
5. Connection state affirmation bundle

Directing table examination for R1

Destination	Metric	Next Hop	Out Interface
10.10.10.0/24	30720	10.10.1.2	FastEthernet 0/0
10.10.20.0/24	33280	10.10.0.2	FastEthernet 0/1
10.10.30.0/24	33280	10.10.0.2	FastEthernet 0/1
10.10.40.0/24	33280	10.10.0.3	FastEthernet 0/1
10.10.50.0/24	33280	10.10.0.3	FastEthernet 0/1
10.10.60.0/24	33280	10.10.0.3	FastEthernet 0/1

**Table-3**

Metric Analysis

EIGRP: bandwidth =  $(107 / 105) \times 256 = 25600$

delay =  $[(100 / 10) + (100 / 10)] \times 256 = 5120$

Metric =  $[1 \times 25600 + 1 \times 5120] = 30720$

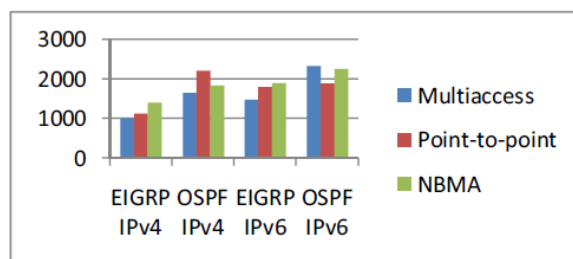
delay =  $[(100 / 10) + (100 / 10) + (100 / 10)] \times 256 = 7680$

Metric =  $[1 \times 25600 + 1 \times 7680] = 33280$

OSPF metric analysis is  $1 + 1 = 2$

### C. Packet Loss Analysis

There is some bundle that is prevail to touch base to the goal. Bundle misfortune is shown with "Goal have inaccessible". Parcel misfortune happens after the course in the steering table is disposed of, or interfaces on one switch is killed.



**Graph-3**

Total packet sent when routing information exchange process

## 6. Investigating DHCP and DNS Protocols Using Wireshark (S.Naaz & F.A Badroo, 2016)

DHCP and DNS are the most generally utilized as a part of host setup and they work in information connect layer. For the most part these conventions are powerless against number of ambushes like in DHCP the strikes are DHCP Starvation attack and Rogue DHCP ambush while in DNS the ambushes are DNS Hijacking Attack and DNS Cache Poisoning Attack. These traditions have been investigated in this investigation where DHCP and DNS packages have been gotten and separated them with the help of Wireshark. Generally we have separated how IP convey is designated to a client from a DHCP Server and how allocates exchanged between the DHCP client and DHCP Server and DNS is used for assurance of URL into IP address.

The examination of DHCP Discover divide been finished in a home framework where a singular PC was related with that framework. There has been an exchange of four particular bundles in which the PC imparts a message to the DHCP Server. The limit of the DHCP Server is the response to the DHCP client and consign an IP address that is unicast.

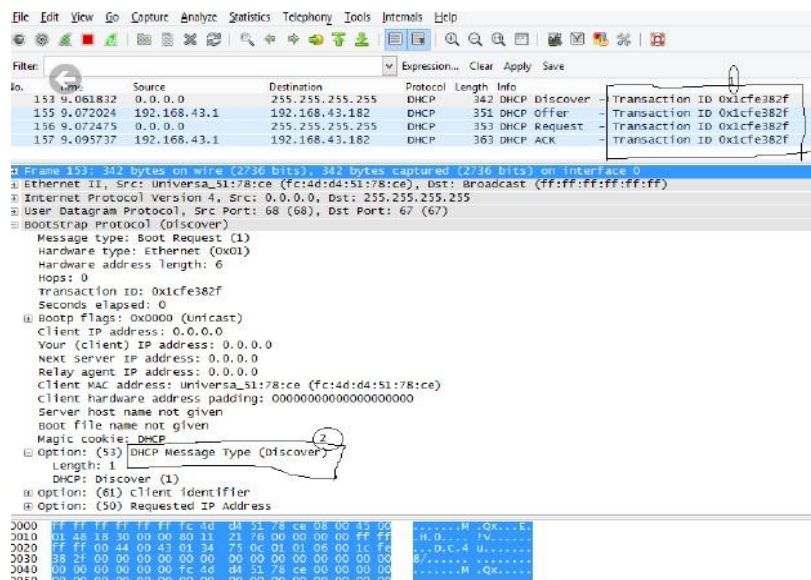


Fig-6

### DHCP Request



The client sends DHCP Request (Broadcast) that it has recognized the offered IP and it certainly diminishes others offers from various servers accepting any.

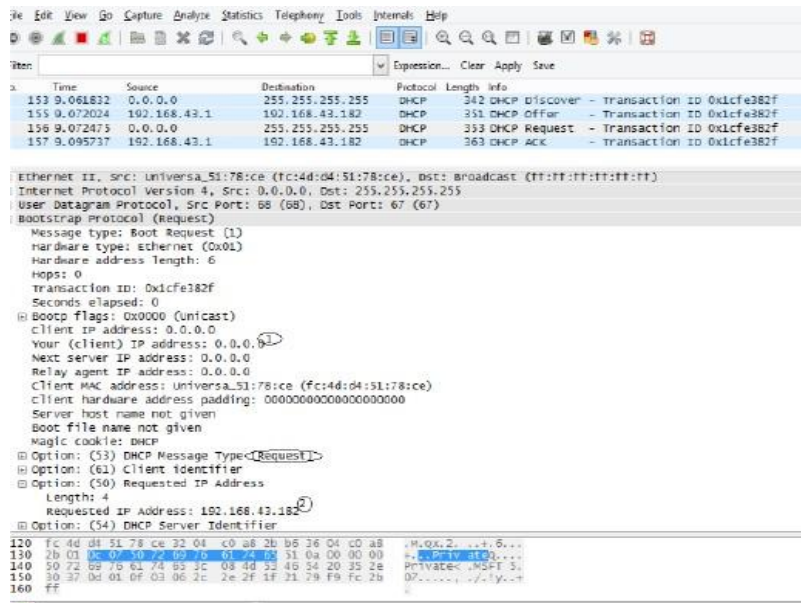
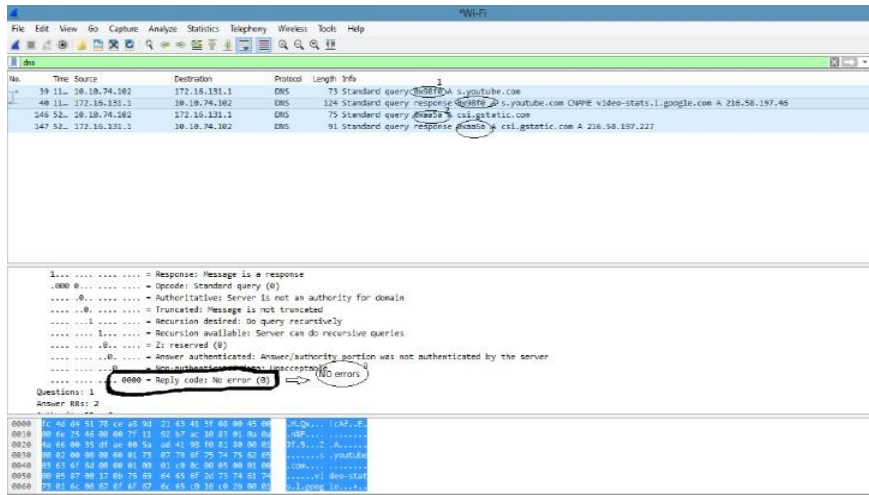


Fig-7

**DNS PACKETS** The route toward researching the DNS in Wireshark suggests that we have to scan for DNS missteps and DNS delays. Primarily we have to look for DNS responses. While distinguishing DNS delays in Wireshark, we have to affirm the IPv4 checksum and it will keep us from false positives. In like manner DNS action doesn't have any shading standard in Wireshark anyway it uses the UDP Coloring conclude that is setting on the most astounding purpose of the UDP header. In this work, we have investigated DNS both in LAN and in our home framework. In the LAN Network we basically start our Wireshark and essentially make two request meanwhile with the help of program. We simply use the show channel detail and form the DNS there and apply it as a channel. From Fig. it is sure that request get two responses with a comparable trade Id exclusively. Another way is check the DNS goofs in the package header where we have to tap on the space structure and starting there we have to check the appropriate response code and if 0000=reply code that mean we have no errors that is all is well or if there is something other than zero that is an issue.



**Fig-8**

In this examination work, they have profoundly contemplated and explored the DHCP and DNS conventions utilizing wireshark. As we probably am aware there is a connection between these two conventions as the DHCP is a standout amongst the most utilized system convention utilized for organize setups and DNS is utilized to determination of URL into IP address. In this work we have designed two PCs with the DHCP and DNS Servers with the assistance of hardware to be specific as Cisco Packet Tracer Student and after that powerfully allotted them arrange parameters with these Servers. Besides we have examined DHCP Packets all the more profoundly and concentrated how one can distinguish if there are in excess of one offers to a DHCP Client i.e.; how might we recognize Rogue DHCP Server.

Additionally we have examined DNS parcels both in LAN and home system and discovered DNS blunders and DNS delays.

### **7. Quality of Service (QoS) Sensitivity for the OSPF Protocol in the Airborne Networking Environment (D.Kiwior, E.G. Idhaw, and S.V Pizzi,2005)**

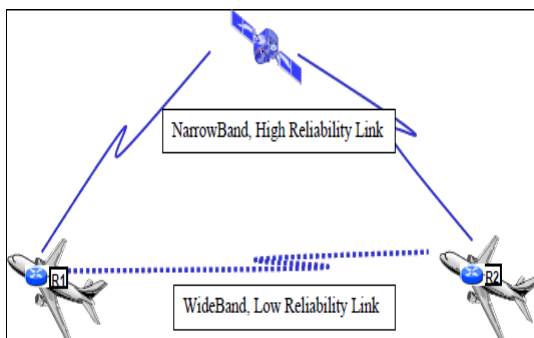
Their examinations, which inspected the impacts of OSPF settings in an Airborne Network condition, show that arranging the settings to give speedier merging can decrease the activity misfortune by up to 80%. Normal bundle inactivity and normal parcel jitter were not essentially influenced by the progressions to the OSPF clocks. It will

be imperative for the Airborne Network to consider availability intrusions while designing a directing convention to restrain information misfortunes.

Executing QoS in an airborne system is a considerably more troublesome issue. The variable connection nature of (remote) airborne connections introduces extra difficulties to any QoS system. Overprovisioning isn't a reasonable alternative for strategic systems that are compelled by restricted data transfer capacity assets. For both IntServ and DiffServ, the subject of whether QoS can be conveyed effectively is identified with the steering convention's capacity to respond to transient connection qualities. Steering conventions being used today have not expected to manage connect blackouts all the time. They have not been tried in circumstances where connect inconstancy is the standard.

OSPF Timer Settings	Description	Cisco Default Settings (sec)
Hello Interval	Time delay between successive Hello packets	10
Dead Interval	Time delay since the last Hello before a link is declared down. Usually 4 times the Hello Interval.	40
SPF Delay	Time delay between a link update notification and the ShortestPath First (SPF) calculation	5
SPF Holdtime	Minimum time delay between successive Shortest Path First (SPF) calculations	10
Minimum LS Interval	Minimum time between distinct originations of any particular Link State Advertisement (LSA).	5

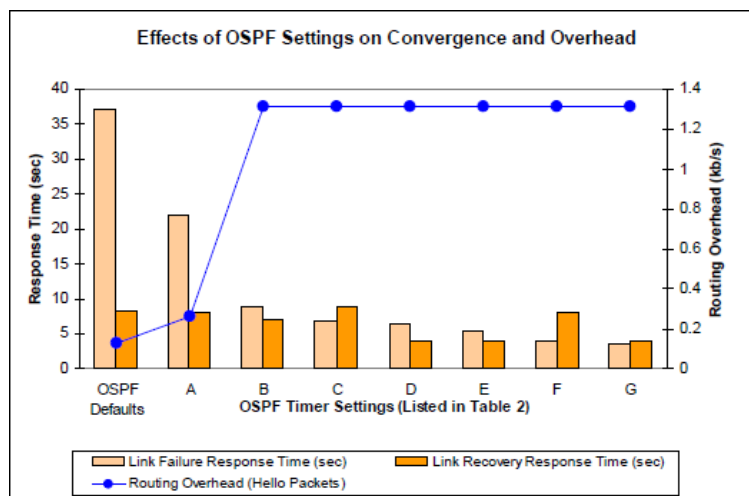
**Table-4**



**Fig-9**

OSPF Timer Settings	Hello Interval (sec)	Dead Interval (sec)	SPF Delay (sec)	SPF Holdtime (sec)	Min LS Interval (sec)
OSPF Defaults	10	40	5	10	5
A	5	20	5	10	5
B	1	4	5	10	5
C	1	4	1	4	5
D	1	4	1	4	1
E	1	4	0	0	1
F	1	2	0	0	5
G	1	2	0	0	1

**Table-5**



**Graph-4**

Their analyses contemplating the impacts of OSPF settings in an Airborne Network condition exhibited that arranging the settings to give speedier joining decreased the loss of High Priority activity by up to 80% with no huge consequences for inertness and jitter. These outcomes exhibit the significance of changing the clocks of a connection state steering convention, for example, OSPF, in an Airborne Network. Instead of depending on default settings, the clock settings of an airborne steering convention need to address the discontinuous conduct of the connections. Exact advancement of the clock settings will include extra research.

**8. A Review of Simulation of Telecommunication Networks: Simulators, Classification, Comparison, Methodologies, and Recommendations(N.I. Sarkar and S.A. Halim,2011)**

The target of this paper is to study, order, and contrast media transmission arrange test systems with help specialists in choosing the most fitting reproduction device. We think about the system test systems in light of write, sending mode, arrange hindrances and convention upheld. We talk about test system assessment strategies and procedures, and give rules to best practice in arrange recreation.

The validity of the recreation programming is a critical issue while surveying a system. The execution of different procedures amid recreation run may influence the last outcomes. A reenactment procedure ought to speak to the genuine system condition being assessed.

Simulator	Type	Deployment mode	Network impairments	Network protocol supported
OPNET	Commercial /academic	Enterprise	Link models such as bus and point-to-point (P2P), queuing service such as Last-in-First-Out (LIFO), First-in-First-Out (FIFO), priority non-preemptive queuing, round-robin.	ATM, TCP, Fiber distributed data interface (FDDI), IP, Ethernet, Frame Relay, 802.11, and support for wireless.
QualNet	Commercial	Enterprise	Evaluation of various protocols.	Wired and wireless networks; wide-area networks.
NetSim	Commercial /academic	Large-scale	Relative positions of stations on the network, realistic modeling of signal propagation, the transmission deferral mechanisms, collision handling and detection process.	WLAN, Ethernet, TCP/IP, and ATM
Shunra VE	Commercial	Enterprise	Latency, jitter and packet loss, bandwidth congestion and utilization.	Point-to-point, N-Tier, hub and spoke, fully meshed networks.
Ns-2	Open source	Small-scale	Congestion control, transport protocols, queuing and routing algorithms, and multicast.	TCP/IP, Multicast routing, TCP protocols over wired and wireless networks.
GloMoSim	Open source	Large-scale	Evaluation of various wireless network protocols including channel models, transport, and MAC protocols.	Wireless networks.
OMNeT++	Open source	Small-scale	Latency, jitter, and packet losses.	Wireless networks
P2P Realm	Open source	Small-scale	Verify P2P network requirements, topology management algorithm or resource discovery.	Peer to peer (P2P)
GTNetS	Open source	Large-scale	Packet tracing, queuing methods, statistical methods, random number generators.	Point-to-Point, Shared Ethernet, Switched Ethernet, and Wireless links.
AKAROA	Open source	Small-scale	Protocol evaluation.	Wired and wireless networks, Ethernet.

**Table-6**

Simulation aspect	Explanation
General feature	Evaluates the general features of simulators such as the type of simulation (discrete/continuous), ease of use, and user friendliness.
Visual	Evaluates the quality of the graphical representation of the simulation models such as icons and animation.
Coding	Evaluates the flexibility and robustness of the software in allowing additional coding.
Efficiency	Evaluates the capability and effectiveness in modeling variety of complex systems.
Modeling assistance	Evaluates the type and level of assistance provided by the software such as online help.
Testability	Evaluates the facilities for model verification such as error messages, and provision of steps function.
Software compatibility	Evaluates whether the software can be integrated or interfaced with other software such as a benchmarking tool.
Input/Output	Evaluates whether external data can be used with the simulator and also the quality of the output data.
Financial and technical feature	Evaluates the cost and technical features of a simulator such as installation and maintenance issues.
User support	Evaluates the quality of support provided by the supplier such as technical support and updating of products.
Pedigree	Evaluates the origin of the simulator, its distribution and also reputation.

**Table-7**

The goal of this paper is to overview, arrange, and contrast media transmission organize test systems with help scientists in choosing the most proper reenactment apparatus. We look at the system test systems in light of compose, organization mode, arrange debilitations and convention upheld. We examine test system assessment procedures and strategies, and give rules to best practice in arrange recreation.

The validity of the reenactment programming is a critical issue while evaluating a system. The execution of different procedures amid recreation run may influence the last outcomes. A reproduction procedure ought to speak to the real system condition being assessed.

## **9. Creation of an Online Virtual Cisco Router Learning Environment(G.Russell,2011)**

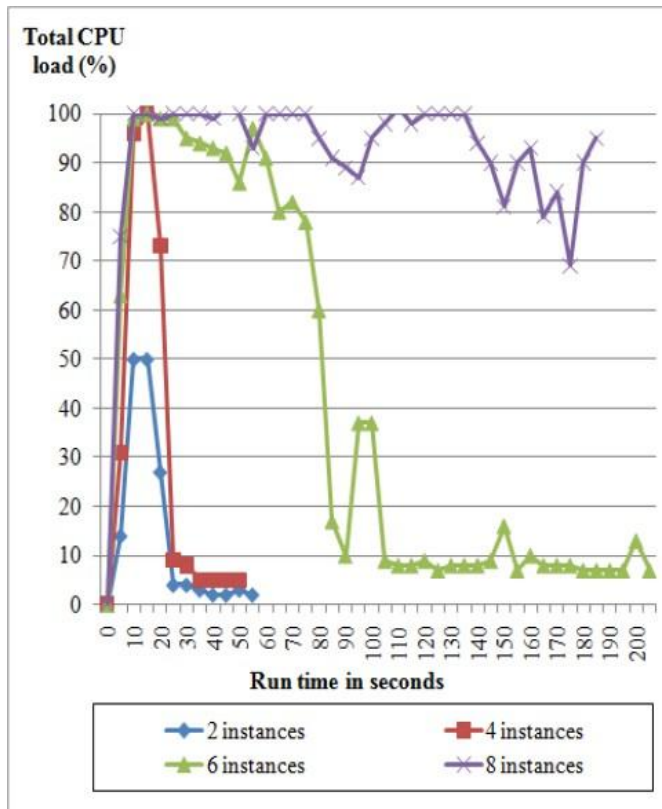
Cisco switches are utilized as a part of the development of numerous PC organize topologies. Switches are one of the gadgets engaged with sending system parcels starting with one gadget then onto the next, i.e. "steering" bundles from the wellspring of the data to a definitive goal. Cisco switches

can be designed in a scope of routes, contingent upon the system topology being actualized, and dealing with this multifaceted nature requires preparing. Cisco gives materials to preparing at an assortment of levels, including mechanically perceived educational programs, for example, CCNA and CCNP.

### Execution

In the midst of green IT (and constrained spending plans), the utilization of assets must be as productive as would be prudent. Hence an execution assessment of the virtual switch learning condition was done. The two estimations analyzed were CPU and memory use. The CPU utilized here was a Xeon 5110 (four centers) timed at 1.6GHz with 2GB of physical memory and 16 GB of swap space.

The assessment covers the execution of simultaneously starting 2, 4, 6, or 8 switches.



**Graph-5**

### **Educational Benefits**

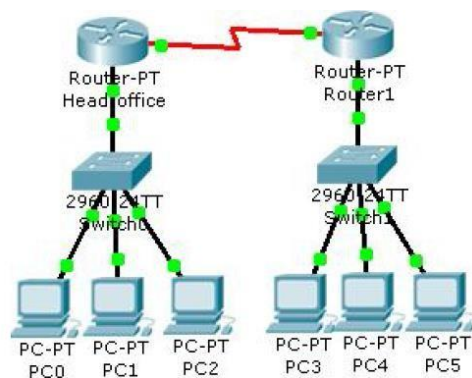
It is valuable to have the capacity to play out an investigation of the instructive effect of this framework. This was researched by experimentation, where five understudies took after extraordinarily planned instructional exercises utilizing genuine Cisco equipment, and five different understudies took after a similar instructional exercise structures utilizing the virtual Cisco switch learning condition in LinuxZoo.

It can be inferred that there is a propensity for understudies with past information and the utilization of the LinuxZoo framework to judge their self-viability somewhat lower than the understudies with past learning who utilized the genuine equipment. This may down to demoralization on getting messages from the framework demonstrating over and over that they didn't answer the inquiry accurately until the point when the correct answer was given (which was additionally discovered in the investigations of). In any case, the understudies who had never had involvement with Cisco switches curiously overestimated themselves, and in term of self-adequacy it didn't make a difference if the virtual condition or the equipment was utilized.

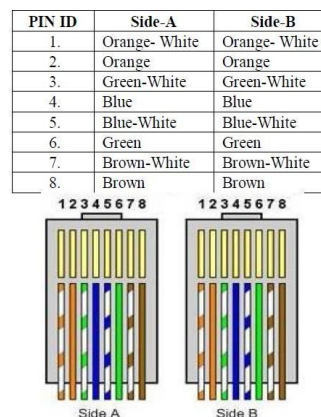


## 10. A study of WAN design, routing protocols and connectivity between Head office to Branch office(Dr. Anil Kumar Singh,2015)

In this paper Dr. Anil Kumar Singh has talked about how Internet Service Providers (ISPs) trade directing data, bundles, between every others. We will outline the WAN condition and exhibit the setup of switches and other directing conventions i.e. Static Routing, Dynamic directing (RIP, OSPF, EIGRP) with the assistance of Packet tracer (Simulator). This paper will see how do WAN Works.



**Fig-10**



**Fig-11**

### Routing loops

Directing circles are found because of the default conduct of RIP where it trades the entire steering tables with its neighbors or because of moderate system joining.

### Routing loop avoidance

Worked in instruments to abstain from steering circles in remove vector directing conventions.

- Route Poisoning – It is an instrument to educate about inaccessible courses to neighbors.
- Split Horizon – A Route learned through an interface is never promoted back on a similar interface it learned.
- Hold-down clock – Timer set to dodge conflicting updates.

- Flash refresh (Triggered refresh): Route will utilize streak refresh to imply topology changes to neighbor.

## EIGRP TERMINOLOGY

Practical Distance: Feasible separation (FD) is the cost of the best course to a goal, including the neighborhood interface cost.

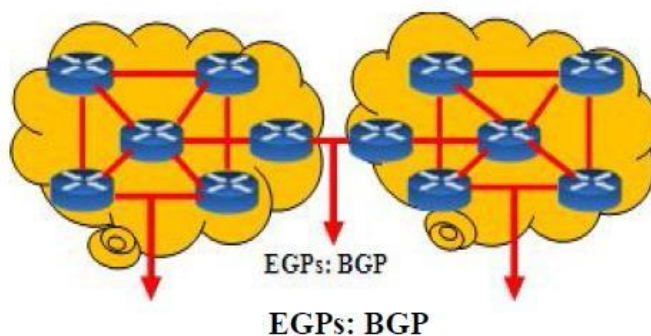
Announced Distance: The cost of a course as publicized by the neighbor, so it does exclude the nearby connection cost if the promoted separate is not as much as the plausible separation, the course is labeled as an attainable successor.

Successor: The neighbor with best cost to the goal.

Achievable Successor: The neighbor with second best cost to the goal.

Detriments of EIGRP - Works just on Cisco Routers

EGP - Exterior Gateway Protocol-Routing convention utilized between various self-governing frameworks. Switches in various AS need an EGP. Fringe Gateway Protocol is broadly utilized as EGP.



**Fig-12**

IGPs conventions work inside the self-governing framework.

EGPs interface distinctive self-sufficient framework

OSPF Tables - It keeps up three tables:

Neighbor Table - Neighbor table contains data about the specifically associated OSPF neighbors shaping contiguousness.

Database table-Database table contains data about the whole perspective of the topology regarding every switch.

Steering data Table-Routing table contains data about the best way figured by the briefest way first calculation in the database table.

Wild Card Mask - A wild card mask can be calculated using the formula:

Global Subnet Mask

- Customized Subnet Mask

-----

Wild Card Mask

-----

Example: 255.255.255.255 255.255.255.255

- 255.255.255. 0 - 255.255.255.240

-----

0. 0. 0. 255 0. 0. 0. 15

Disadvantages of OSPF - Consumes More Memory and CPU processing. Complex configuration.

## **RESULT AND DISCUSSION**

After WAN-Lab setup, researcher's have seen that the two switches (Head office and Branch office) are conveying to each other however their individual LANs are not imparting to each other. At that point they arranged the STATIC (physically) directing conventions. Yet at the same time Head office PCs isn't conveying to Branch office PC.

In this way they designed the entryway IP address (IP address of their individual switch's Ethernet port) in the two closures PC. By and by they attempted to ping Head office PC to Branch office PC and discovered effective answer.

11. <https://learningnetwork.cisco.com/thread/40281> (Alaa Ali Feb 27, 2012 12:04 PM)

The given below network topology

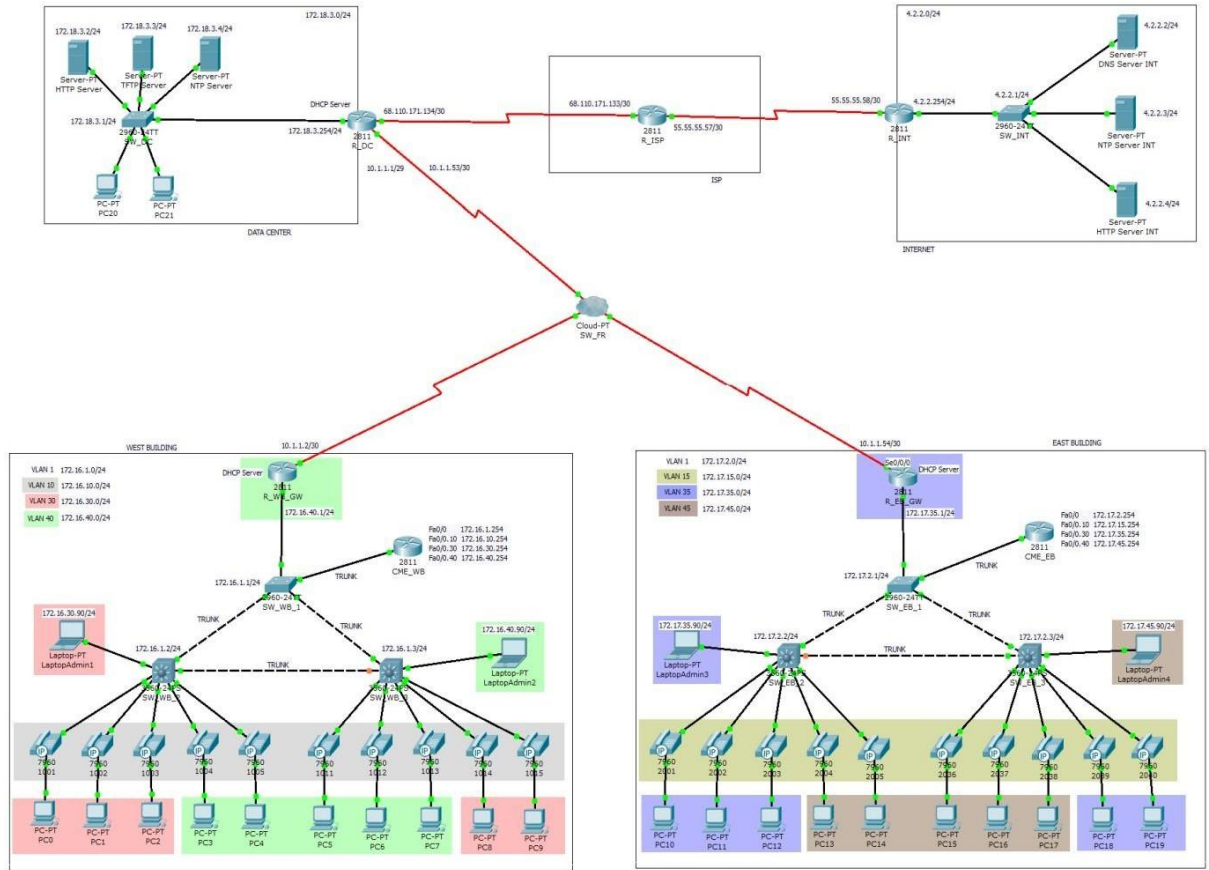


Fig-13

The given beneath organize topology comprises of a West Building (WB), an East Building (EB), and a Data Center (DC), all associated through an edge transfer switch. The Data Center is associated with the ISP to get to the reproduced Internet (it's only a 4.2.2.0/24 organize). All the IP subnets are demonstrated in a little legend key.

**The Steps:**

**West Building**

**1.Switches: IP addresses**

Plan IP addresses for the switches

## **2. Switches: VTP and VLANs**

Main impetus the ports related between the developments to trunk ports. Make VLANs 30 and 40 on one switch, name them D1 and D2 as it were. Deal with the VTP space "WB" on the name the ports that will have PCs appended to the VLANs .

## **3. Switches : STP**

The best switch will be the root switch. As training, endeavor to make sense of which port (on alternate switches obviously) will wind up blocked. Design the best change to be the root switch for all VLANs (1, 30 and 40). Discretionary: Configure ports that are/will be associated with PCs/switches to portfast. Confirm by indicate spreading over tree on all switches that the best switch is the root.

## **4. Switches: Router-on-a-stick**

Organize the switch's Fast Ethernet port on VLAN 1, and two sub interfaces for each one of VLANs 30 (subnet 172.16.77.0/24) and 40 (subnet 172.16.78.0/24); remember to uncover them they'll be getting VLAN information from the specific VLANs.

## **5. Switches: Gateway Router/DHCP**

Arrangement it's FastEthernet port on the VLAN 40 subnet; make sure to coordinate the port on the switch on VLAN 40. Framework DHCP pools for VLANs 30 and 40

## **6. Switches: Routing convention**

EIGRP is used within the wake of outlining coordinating traditions on the two switches, verify by means of demonstrate ip course on the Gateway transfer. you may verify by means of ping to check bury VLAN coordinating. In like manner, ping from a computer on one VLAN to every other laptop on the opposite VLAN..

### **East Building**

Same thing as West Building.

### **Data Center**

there's no VTP right here, no STP, and you do not want to have DHCP layout static IPs. Allude to the image. make use of the identical directing conference. design the serial interface so that it will partner with the ISP with the IP cope with within the photo.

### **ISP**

Configure both serial ports with IPs. Attempt not to arrange a directing convention. as an alternative, design a static route to arrange four.2.2.zero/24 indicating the subsequent switch . that is as a consequence of we do not need this ISP transfer to recognise about ANY of the IPs within the systems/server farm. this may reproduce the "net" involvement; in order that at the off hazard that it receives a ping from any machine, it may not have the potential to answer lower back in light of the reality that it does not have a direction manner to the system's IP...that is the location NAT becomes an indispensable component later. Now, backpedal to the records middle transfer and arrange a default static course to factor to the ISP transfer. At that factor redistribute that direction to trade switches. try not to do NAT yet.

### **Internet**

set up static IPs to servers. howeve once more, do not design a directing conference on the transfer. as an alternative, actually set up a static route to the 68.one hundred ten.171.132/30 organize experiencing the ISP switch

## **Frame Relay**

Utilize point-to-point; They experienced issues with the steering convention when they utilized multipoint. Subnets are demonstrated in the picture. For the casing hand-off switch/cloud itself, simply look at the setup from the completed design, it's straight forward.

Now, the vast majority of the arrangement is finished. Confirm availability between the two structures and Data Center by ping (and Web Browser on the PCs on the off chance that despite everything you have that HTTP server in the Data Center).

## **NAT and ACLs**

Confirm that any gadget won't have the capacity to achieve the web (4.2.2.0/24), since we don't have NAT arranged. Presently, arrange NAT on the Data Center switch. My ACL was arranged as takes after: deny VLAN 40 subnet in WB (aside from switches/administrator PC), deny VLAN 35 subnet in EB (with the exception of switches/administrator PC), and allow the various subnets (I didn't allow any, I allow the particular subnets for training). Sadly, I didn't do some other ACL rehearse; they would make an ACL in each working to just permit administrator PCs to telnet to the switches/switches.

## **12. Performance Evaluation of a Network Using Simulation Tools or Packet Tracer (S.M.Hashimi & Ali Güneş,2017)**

Nowadays the significance of information and getting to statistics is increasing quick, what would we be able to do in a gadget execution assessment making use of reenactment instruments, as an example, community Simulation or Packet tracer and the way distinctive parameters can be united effectively? CCNA, CCNP, HCNA and HCNP instructive degree has been applied and important placing has been mimicked one at a time. at the outcome this is a respectable guide for a neighbourhood or huge territory arrange. At remaining, the execution troubles safety measures depicted. thinking about the crucial parameters, fanciful structures had been composed and assessed both in CISCO Packet Tracer and Huawei's eNSP re-enactment program. yet, it ought now not be

left implied that the systems had been composed and assessed in free virtual conditions, no longer in a genuine lab. hence, it's far tough to make real execution evaluation and yield as there's no actual records handy.

distinction among overall performance testing, Load trying out and stress testing  
Execution checking out - while interfacing a machine with the device to ship or get facts from a particular asset to a selected purpose. The vital issue is velocity of device exhibitions that how short the statistics is journeying between various nodes. To perceive and decide the section elements of a framework execution and the way arranges are acting in a selected condition, use of belongings, unwavering high-quality and legitimacy of the object is under trying of subtest of efficiency tuning. concentrating on every hub tending to execution troubles inside the plan, engineering of programming items.

Load checking out

Execution testing - at the same time as interfacing a machine with the machine to ship or get facts from a selected asset to a specific intention. The vital issue is velocity of device exhibitions that how brief the statistics is travelling among numerous nodes. To perceive and determine the section components of a framework execution and how arranges are acting in a particular condition, use of assets, unwavering great and legitimacy of the item is underneath trying of subtest of performance tuning. targeting each hub tending to execution problems in the plan, engineering of programming gadgets.

strain checking out

checking out underneath strain, extraordinary errands to stack increasingly the existing belongings with higher occupations are acknowledged that have push to make the framework down. bad trying out, which incorporate give up of 1 angle or component from framework and moreover referred to as phase of stress checking out. moreover, is named as weariness checking out, as we comprehend that exhaustion is commonly in exercise but right here we are able to call stress checking out as weak point testing, this checking out need to take the maintaining up of the application by using trying out it in preference to its transmission capacity capacity.



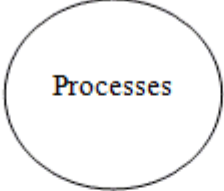
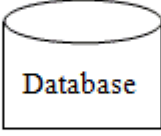
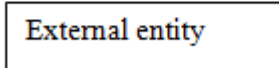
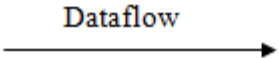
**CHAPTER 3**  
**SYSTEM DEVELOPMENT**

**3.1 SOFTWARE REQUIREMENTS**

- Cisco Packet Tracer Student
- Wire Shark

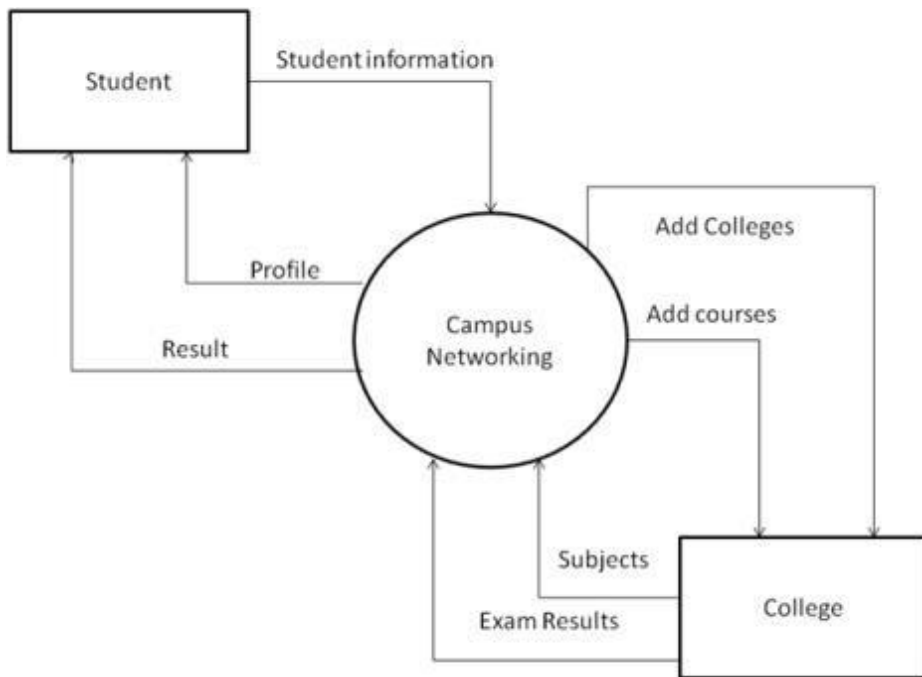
**3.2 PROPOSED MODEL OR SYSTEM DESIGN**

**Some of the symbols used in data flow diagram**

 <p>Processes</p>	<p>The process shows a transformation or manipulation of dataflow with in a system. A process transforms in coming data flow into out going data flow.</p>
 <p>Database</p>	<p>A database is a holding place for information within the system it is represented by an open ended narrow rectangle.</p>
 <p>External entity</p>	<p>External entities are outside the system but they either supply input data into the system or use the system output. External entities are represented by rectangle.</p>
 <p>Dataflow</p>	<p>a dataflow shows flow of information form source to destination a data flow represented by a line, with arrow heads showing the direction of the flow.</p>

**Fig-14**

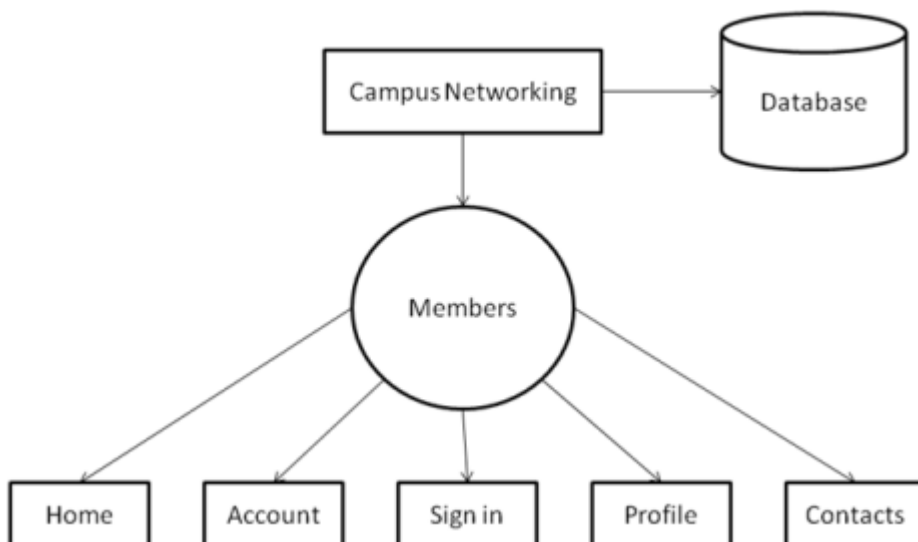
Context flow diagram: The earth in which the product utilized is delineated in this image. The CFD demonstrates the out of doors element interest at the product is appeared right here CFD.



**Fig-15**

Top level DFD:

Top level DFD shows the practical thing in the software program package deal. every component proven within the pinnacle level DFD.



**Fig-16**

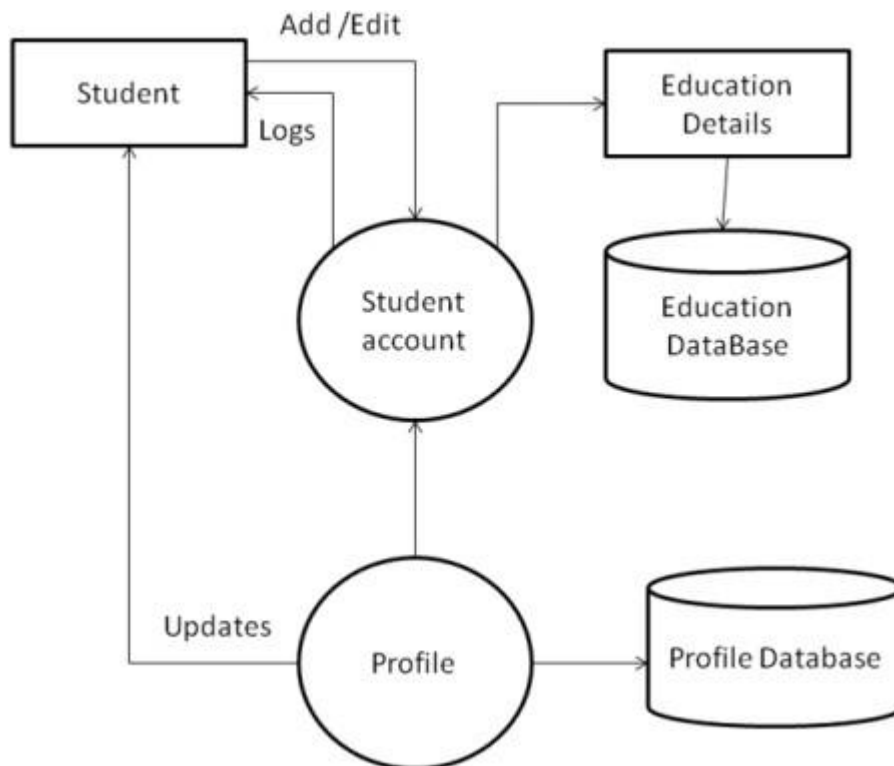
Description of the additives

purposeful issue 1: scholar Profile

input– pupil provides profile information and schooling info .

procedure– gadget assessments previous pupil account and schooling info.

Output– student can view education detail and profile details.



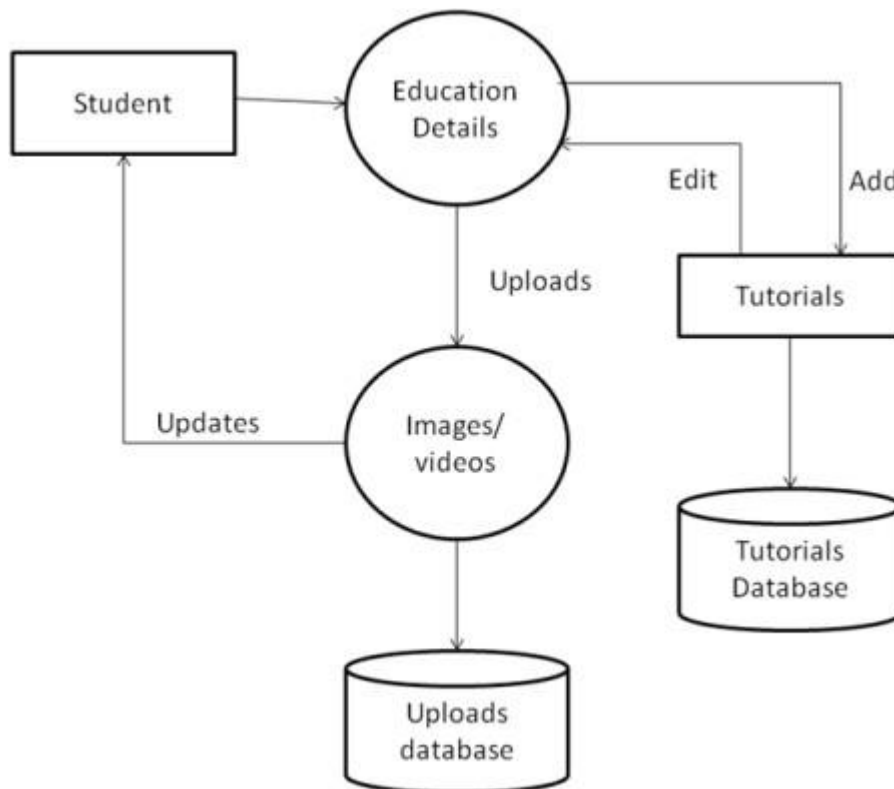
**Fig-17**

Utilitarian part 2: Tutorials

Input– Student transfers instruction articles, instructional exercises, pictures, recordings and so on.

Process– System transfers instruction articles, instructional exercises, pictures, recordings to database.

Output– Student can see transferred instruction articles, instructional exercises, pictures, recordings and so on.



**Fig-18**

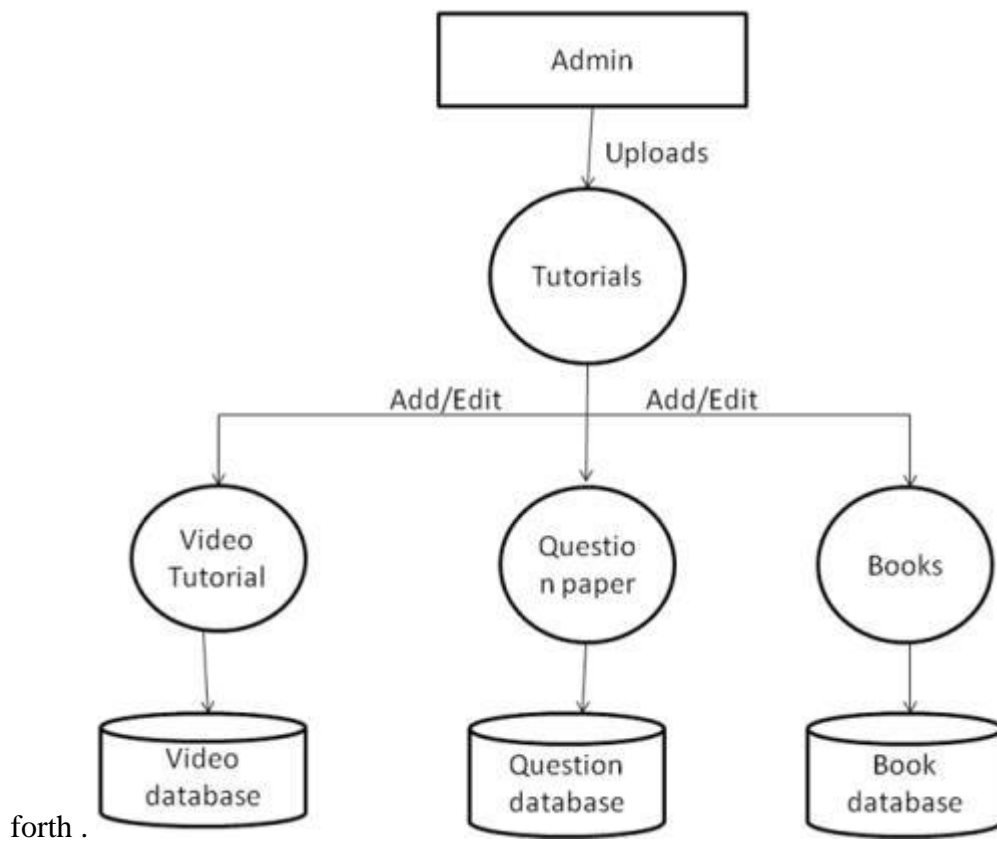
Utilitarian segment 3: Admin

Input– Admin can transfer and offer video instructional exercises, question papers, books and so forth.

Process– System transfers training instructional exercises, question papers, books to database.

---

Output– Student can see transferred instructional exercises, question papers, books and so



forth .

**Fig-19**

### **3.3 ALGORITHMS AND CODES**

Router configuration

**Router 1** Router> en Router# conf t

Router(config-if) #ip addr 172.22.0.1 255.255.0.0

Router(config-if) #no shut

Router(config) #int f0/1

Router(config-if)# ip addr 172.22.0.1 255.255.0.0 Router(config-if)

#no shut

**Router2** Router >en Router #conf t

Router(config) #int s0/2/0

Router(config-if) #ip addr 192.148.0.2 255.255.255.0

Router(config-if) #no shut

Router(config-if) #exit

Router(config) #int s0/3/0

Router(config-if) #ip addr 192.168.2.1 255.255.255.0

Router(config-if) #clock rate 64000 Router(config-if) #no shut

Router(config-if) #exit

Router(config) #int f0/0

Router(config-if) #ip addr 171.17.0.1 255.255.0.0 Router(config-if)

#no shut

Router(config-if) #exit

Router(config) #int f0/1

Router(config-if) #ip addr 172.16.0.1 255.255.0.0

Router(config-if) #no shut

Router(config-if) #exit

**Router3** Router>en Router#conf t

Router(config) #int s0/3/0

Router(config-if) #ip addr 192.168.1.2 255.255.255.0

Router(config-if) #no shut Router(config-if) #exit

Router(config) #int s0/2/0

Router(config-if) #ip addr 192.168.2.2 255.255.255.0

Router(config-if) #no shut Router(config-if) #exit

Router(config) #int f0/0

Router(config-if) #ip addr 172.19.0.1 255.255.0.0

Router(config-if) #no shut

Router(config-if) #exit

Router(config) #int f0/1

Router(config-if) #ip addr 172.18.0.1 255.255.0.0

Router(config-if) #no shut

Router(config-if) #exit

Frame-relay configuration

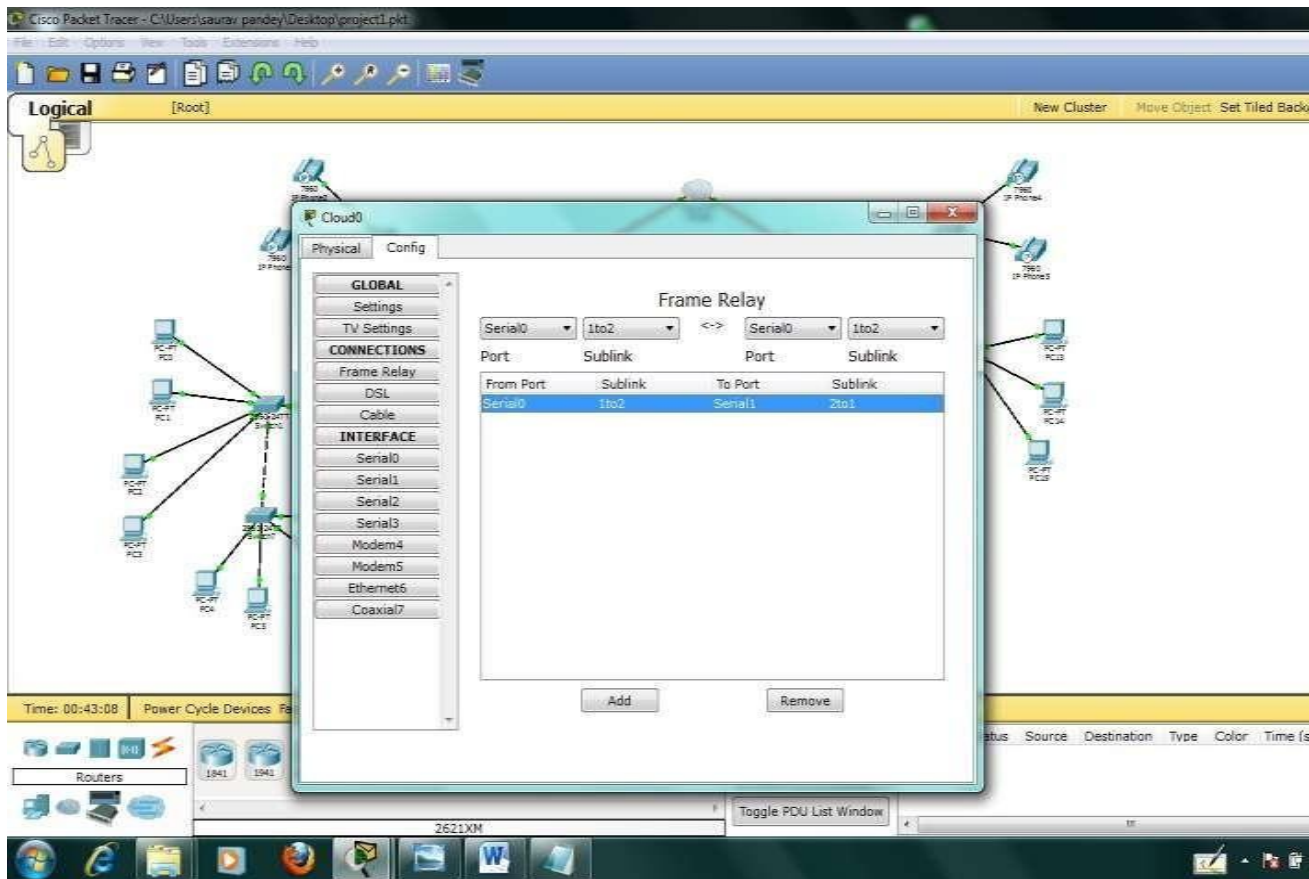


Fig-20

Router1 (frame-relay)

Router(config) #int s0/2/0

Router(config-if) #encapsulation frame-relay

Router(config-if) #frame-relay lmi-type cisco

Router(config-if) #frame-relay interface-dlci 102

Router(config-if) #no shut

Router3 (frame-relay)

Router(config) #int s0/2/0

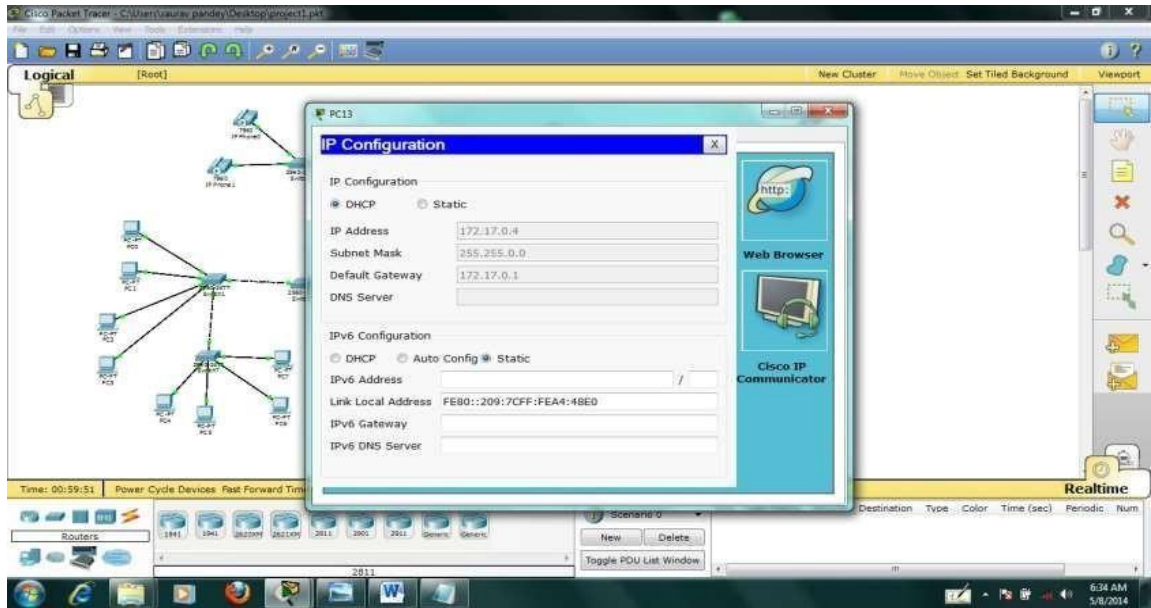
Router(config-if) #encapsulation frame-relay

Router(config-if) #frame-relay lmi-type cisco

Router(config-if) #frame-relay interface-dlci 201 Router (config-if)#no shut

DHCP





**Fig-21**

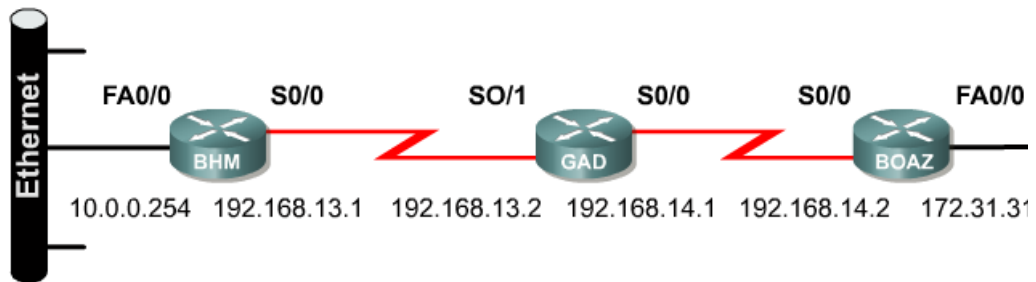
**Router1**

```

Router(config)  #ip dhcp  pool R1  Router  (dhcp-config)#  network
172.20.0.0
255.255.0.0
Router(dhcp-config)  #default-router  172.22.0.1  Router(dhcp-config)
#exit

```

## RIP (ROUTING INFORMATION PROTOCOL)



```
BHM(config)#router rip
BHM(config-router)#network 10.0.0.0
BHM(config-router)#network 192.168.13.0
```

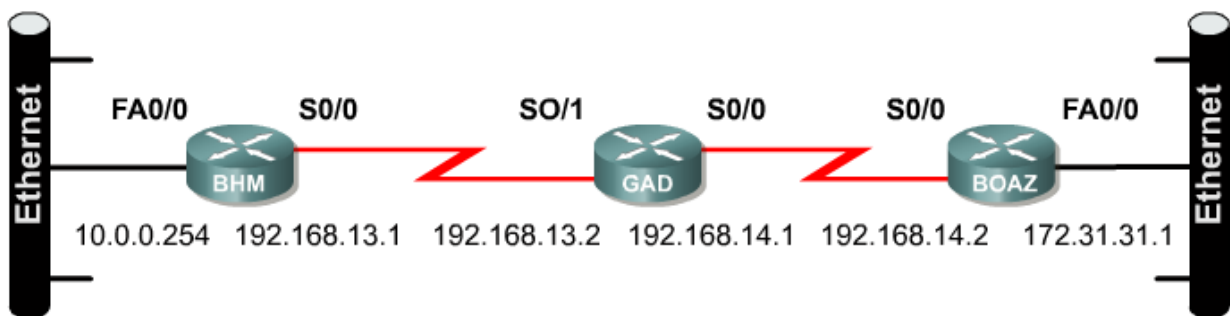
Router(config)#router tear

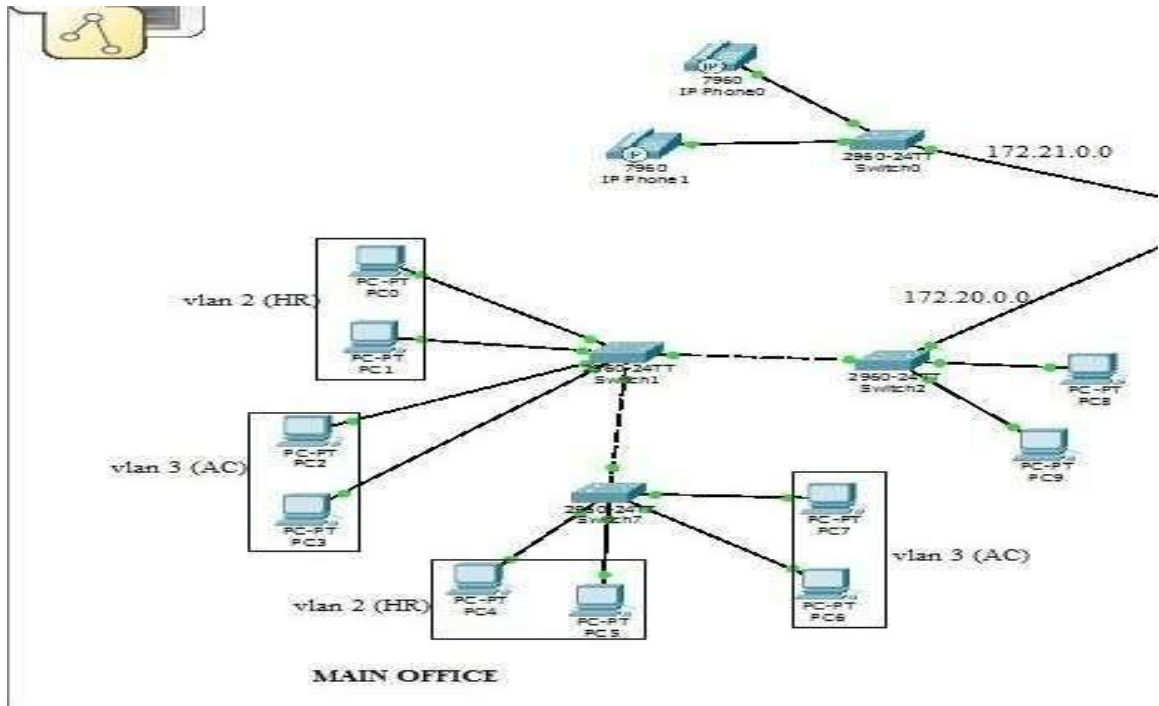
Empowers the RIP steering process

Router(config-router)#network arrange number

Partners a system with the RIP directing procedure

**How would a user configure RIP on the GAD router?**





**Fig-22**

### VLAN

The switch must have the capacity to converse with the switch utilizing an institutionalized trunking convention (epitome).

To characterize the VLAN epitome, enter the embodiment charge in interface design mode.

```
Router(config-if)#encapsulation dot1q vlan-number
```

The vlan-number recognizes the VLAN for which the subinterface will convey activity.

```
Router_A(config-subif)# ip address ip-address subnet-mask
```

```
Router_A(config)#interface fastethernet 0/0
```

```
Router_A(config-if)#no shutdown
```

```
Router_A(config-if)#interface fastethernet 0/0.1
```

```
Router_A(config-subif)#encapsulation dot1q 1
```

```
Router_A(config-subif)#ip address 192.168.1.1 255.255.255.0
```

## TELNET

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

P 172.16.90.0 255.255.255.0, 2 successors, FD is 0

by means of 172.16.80.28 (46251776/46226176), Ethernet0

by means of 172.16.81.28 (46251776/46226176), Ethernet1

by means of 172.16.80.31 (46277376/46251776), Serial0

P 172.16.81.0 255.255.255.0, 1 successors, FD is 307200

by means of Connected, Ethernet1

by means of 172.16.81.28 (307200/281600), Ethernet1

by means of 172.16.80.28 (307200/281600), Ethernet0

by means of 172.16.80.31 (332800/307200), Serial0

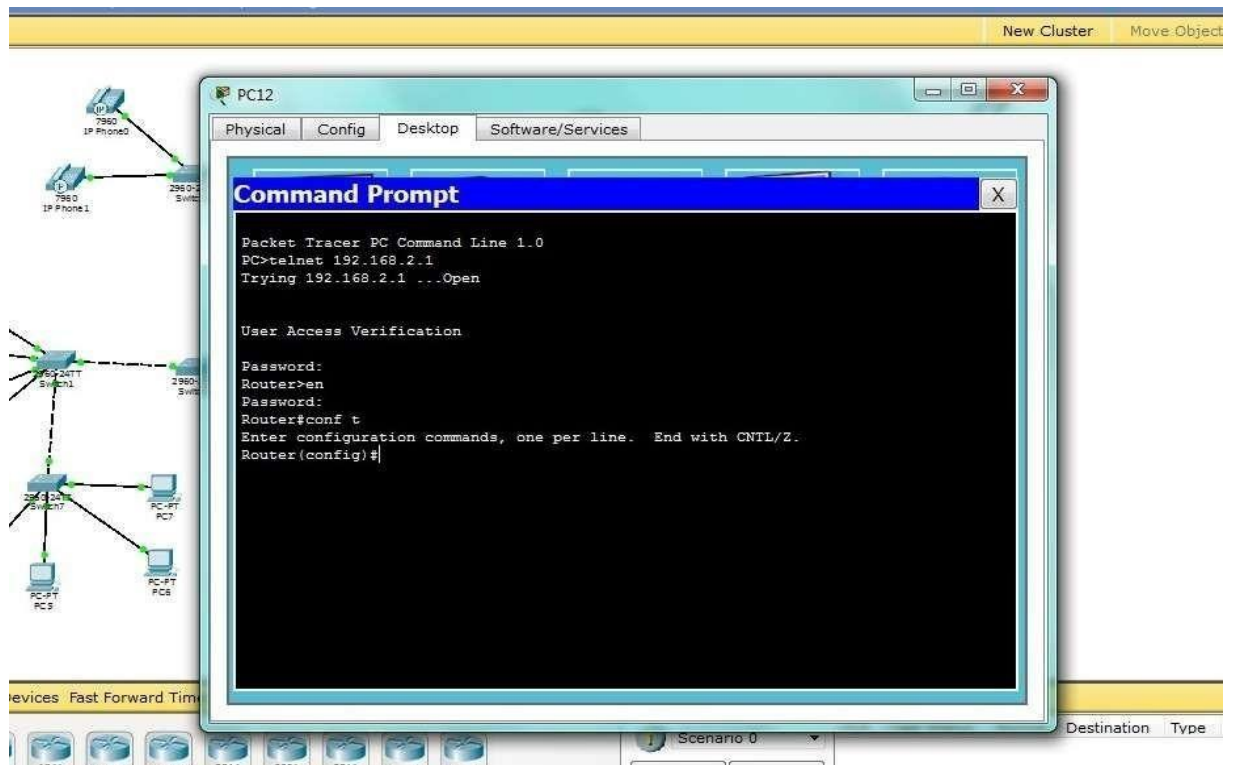
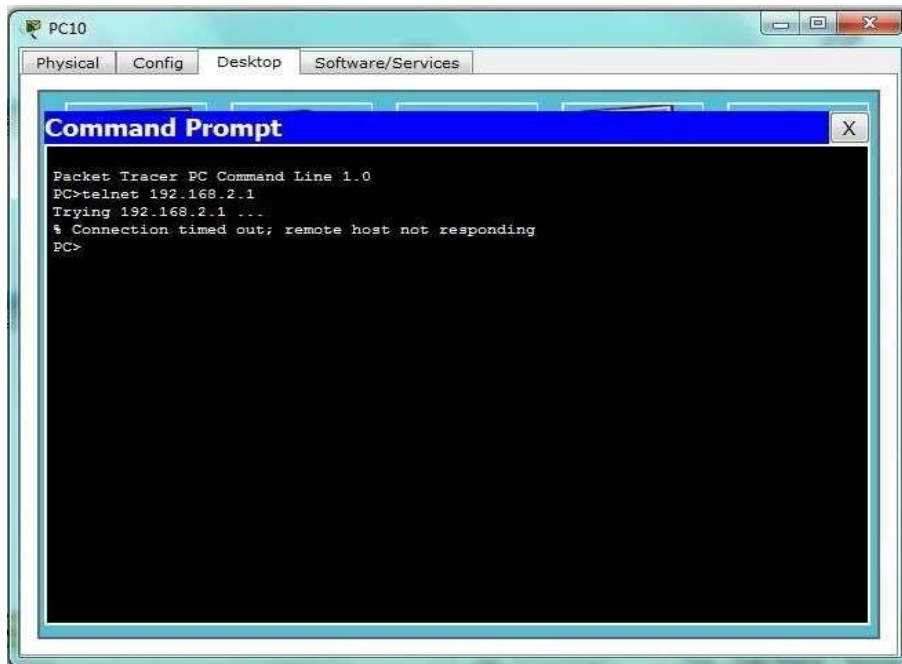


Fig-23



**Fig-24**

### **Voice over IP (VOIP)**

(VoIP, or voice over Internet Protocol) usually alludes to the correspondence conventions, innovations, approaches, and transmission systems associated with the conveyance of voice interchanges and mixed media sessions over Internet Protocol (IP) systems, for example, the Internet. Different terms usually connected with VoIP are IP telephony, Internet communication, voice over broadband (VoBB), broadband communication, IP correspondences, and broadband telephone.

Web communication alludes to correspondences administrations — voice, fax, SMS, or potentially voice-informing applications—that are transported by means of the Internet, instead of people in general exchanged phone organize (PSTN). The means associated with beginning a VoIP phone call are flagging and media channel setup, digitization of the simple voice flag, encoding, packetization, and transmission as Internet Protocol (IP) bundles over a parcel exchanged system. On the accepting side, comparable advances (for the most part in the turn around arrange, for example, gathering of the IP bundles, deciphering of the parcels and computerized to-simple transformation imitate the first voice stream. Despite the fact that IP communication and VoIP are utilized reciprocally, IP communication alludes to all utilization of IP conventions for voice correspondence by

advanced communication frameworks, while VoIP is one innovation utilized by IP communication to transport telephone calls.

```
Router(config) #ip dhcp pool voice
```

```
Router(dhcp-config) #option 150 ip 192.168.1.1
```

```
Router(dhcp-config) #exit
```

```
Router(config) #telephony-service
```

```
Router(config-telephony) #max-dn 5
```

```
Router(config-telephony) #max-ephones 5
```

```
Router(config-telephony) #ip source-address 192.168.1.1 port 2000
```

```
Router(config-telephony) #auto assign 1 to 9
```

```
Router(config -telephony) #exit
```

```
Router(config) #ephone-dn 1
```

```
%LINK-3- UPDOWN: Interface ephone_dsp DN 1.1, changed state to up
```

```
Router(config-ephone-dn) #number 12345
```

```
Router(config-ephone-dn) #exit
```

```
%IPPHONE-6-REGISTER: ephone-1 IP:192.168.1.2 Socket:2 DeviceType:Phone has registered.
```

```
Router(config) #ephone- dn 2
```

```
Router (config-ephone-dn) # number 123
Router (config-ephone-dn) # exit
```



```

Router (config) # ephone-dn 3

Router (config-ephone-dn) #number 11111
Router (config-ephone-dn) #exit

```



**Fig-25**

## CHAPTER 4

### PERFORMANCE ANALYSIS

#### 4.1 PERFORMANCE PARAMETER

Keeping in mind the end goal to break down the system regarding system joining action, Ethernet deferral and convention movement sent are picked.

#### System ANALYSIS

Keeping in mind the end goal to break down the system regarding system meeting action, Ethernet deferral and convention movement sent are picked.

##### A. System Convergence:

Meeting is the procedure of switches concurring on ideal courses for sending bundles and in this way finishing the refreshing of their steering tables. Merging happens because of an adjustment in arrange topology, i.e., a connection getting to be accessible or inaccessible. At the point when this happens, every switch freely runs a steering calculation to recalculate measurements and manufacture another directing table in view of this data. When all the steering tables have been refreshed, merging is finished. The time required earlier than the more a part of the switches can attain an accord with admire to the new topology, known as assembly time, is based upon the amount of switches within the gadget that usage dynamic steering conventions, the separation of switches (estimated in bounces) from the motive of progress, the information transfer capability and interest stack on correspondences joins and the heap on the switches. a few of the manners via which becoming a member of time can be constrained are utilizing more desirable merging calculations and making plans the gadget with the aim that less switches want to meet thus that the heap on any given switch or interchanges interface is restrained.

Merging is vital in mild of the reality that switches are insightful devices which are suit for settling on their own guidance picks. This appropriated insight is commonly a significant preferred perspective, since it permits giant structures to be endlessly quicker, more sturdy and extra talented than could be potential with coordinate human mediation.

For EIGRP convention, the gadget joining time is the most constrained yet the OSPF organize takes additional time than the EIGRP community.

<b>Protocol</b>	<b>RIP</b>	<b>EIGRP</b>	<b>OSPF</b>
<b>suits</b>	Small network	Large network	Large network
<b>Convergence time</b>	slow	fast	Fast
<b>Ease of configuration</b>	Easy	easiest	Complex
<b>100% loop free</b>	No	yes	Yes
<b>VLSM</b>	Only in RIPv2	yes	Yes
<b>Bandwidth consumption</b>	High	low	Moderate

**Table-8**

B. Directing Traffic: Network activity or information movement is information in a system. In PC organizes, the information is exemplified in arrange parcels. Information transmitted over a system. Activity is an extremely broad term and normally alludes to general system use at a given minute. Be that as it may, it can allude to particular exchanges, messages, records or clients in any sort of information or phone organize. OSPF convention gives higher movement contrasted with EIGRP and RIP. After disappointment/recuperation happened, OSPF convention gives bring down activity than EIGRP.

C. Ethernet Delay: Network delay is an imperative outline and execution normal for a PC system or media communications arrange. The deferral of a system indicates to what extent it takes for a touch of information to traverse the system from one hub or endpoint another. It is commonly estimated in products or portions of seconds. Postponement may

contrast somewhat, contingent upon the area of the particular combine of imparting hubs. Hence, designs generally report both the most extreme and normal deferral, and they isolate the postponement into a few sections: Processing delay, Queuing delay, Transmission postponement and Propagation delay.

**Processing Delay**-time switches take to process the parcel header

**Queuing Delay**-time the parcel sends in steering lines

**Transmission Delay**-time it takes to push the bundle's bits on the connection

**Propagation Delay**-time for a flag to achieve its goal

There is a sure least level of postpone that will be experienced because of the time it takes to transmit a bundle serially through a connection. Onto this is included a more factor level of deferral because of system clog. IP organize deferrals can go from only a couple of milliseconds to a few hundred milliseconds. EIGRP gives least postponement and RIP .

## **CHAPTER 5**

### **CONCLUSION**

Our decision shows that CISCO Packet Tracer can be utilized by arrange organizers to choose the most reasonable steering convention for different systems and to outline an ideal directing topology. Among the IGP writes the best convention is EIGRP on the grounds that it gives a superior execution than RIP and OSPF, it has a decent effect in the realm of systems administration because of its quick union time, enhanced adaptability and without a doubt the considerable treatment of directing circles and furthermore EIGRP has an incredible effect in HTTP application which enables it to be in the number one spot of steering conventions.

#### **5.1 FUTURE SCOPE**

We can make this system more intricate by expanding its heap and after that break down its execution in light of various parameters.

#### **5.2 APPLICATIONS**

We can actualize this system, all things considered, situation. Illustration air terminal system, doctor's facility arrange, school organize and so forth to convey between various clients, to store result's and so on.

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