TITLE PAGE

PROBLEMS AND PROSPECT OF APPLICATION

OF LOCAL AREA NETWORK

A CASE STUDY OF FEDERAL POLYTECHNIC NASARAWA

SUBMITTED BY

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DEDICATION

This project paper is wholly and heartedly dedicated to Almighty God the Supreme and the most High, my loving husband (Raph Adebayo) and my children.

CERTIFICATION

We hereby certify that this project work titled **"PROBLEMS AND PROSPECT OF APPLICATION OF LOCAL AREA NETWORK"** A case study of Federal Polytechnic Nasarawa has been read and approved by the undersigned on behalf of the department of Mathematics and Computer science.

The requirement and regulation governing the Award of Post Graduate Diploma (PGD) in Federal University of Technology Minna, Niger State.

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To God be the glory, "great" thing he has done. I have to confess my most sincere gratitude to God who started a good work in me and faithfully has perfected it to this day. His steadfast love never cease.

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ABSTRACT

This project is on the problems and prospect of application of local area network, a case study of federal polytechnic Nasarawa.

Computer network is the interconnection of autonomous computers in order to share resources, such as printers, fax and communication services. Local area network is a type of computer network where several cables are joined together to cover a local geographical area.

This study is attempting to examine the level of computerization achieved by the Federal Polytechnic, Nasarawa, assess the available hardware and software that are not adequate for the support of local area network in the polytechnic, it will also access the level of computer literacy in the polytechnic, the study will design a workable connectivity to share information and computer resources and lastly the study will design a functional server based network for the use in the federal polytechnic Nasarawa.

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CHAPTER ONE

1.0 <u>**GENERAL INTRODUCTION**</u>

Networking is the interconnection of computers together, in order to share resources. The need to connect computers together started as a result of high cost of computer hardware and software. The cost of buying separate resources such as printers and plotters and also software for each computer in an organization is very expensive. And also the need for departments within an organization to share common information is of the reasons that gave rise to the computer networking.

With a developing institution like Federal Polytechnic Nasarawa, networking will become a key technology and it will be of immense benefits to the institution, and going into networking system will make their administrative system to be standardized.

1.1 <u>**AIM AND OBJECTIVES**</u>

1.1.1 AIM

The aim of this project is to design a functional local area network for the use of Federal Polytechnic Nasarawa.

1.1.2 OBJECTIVES

In order to achieve the aim, the following objectives will be pursued.

i. To review literature on computer networking, design and operation.

ii. To assess the level of computerization achieved by the Federal Polytechnic Nasarawa..

iii. To analyse information need in order to design a functional data base.

iv. To design a workable connectivity to share information and computer resources.

1.2. RESEARCH METHODOLOGY

In order to achieve the objectives outlined above, the following methods will be employed.

i. A review of Textbooks on Computer Network and its connectivity

ii. A review of organizational setting of Federal Polytechnic Nasarawa.

iii. A study of Data presentation and analysis through the administration of questionnaire

iv. Visitation to various Schools, Departments and unit of Federal Polytechnic Nasarawa.

1.3. SIGNIFICANCE OF THE PROJECT

At the end of this study, the researcher hopes that:-

i. The institution will be able to determine and evaluate from time to time the relevance of computer networking in their level of administration.

ii. There will be a guaranteed exposure of areas of weakness of copying data to a removable diskette from one department and

carried it to another department where the printer is available to print.

iii. There will advances in data communications and computer technology in the institution.

iv. There will be a growing need for better and faster means of disseminating information within the various departments and the registry.

1.4.   SCOPE AND LIMITATION OF THE STUDY

Limitation of this study include a few principal officers like Registrar, Bursar, Director of Schools, Head of Departments that are directly involve in the administration. In terms of the scope, the study is limited to the Federal Polytechnic Nasarawa as the case study.

1.5.   BRIEF HISTORICAL BACKGROUND OF THE FEDERAL POLYTECHNIC, NASARAWA

The Federal Polytechnic Nasarawa is situated in Nasarawa, the headquarters of Nasarawa Local Government Area of Nasarawa State. Nasarawa is a semi – Urban town on the southern part of the state about 170 kilometers from Lafia, the State capital and 90 kilometers from Abuja.

The Polytechnic was established by the defunct Civilian administration of second Republic (1979 – 1983). Its enabling decree is the "Federal Polytechnic (Amendment) Decree No 33, 1987". Full administrative and academic operations commenced during the

1983/84 session with an initial students population of two hundred and twenty distributed into the following Schools and Department under the Rectorship of Dr. Olateru Olagbegi.

1. **School of Business Studies**

   a. Department of Accountancy

   b. Department of Business Administration and Management.

   c. Department of Secretarial Studies.

2. **School of Environmental Studies**

   a. Department of Architectural Technology

   b. Department of Estate Management

   c. Department of Town and Regional Planning (1984/85).

A preliminary National Diploma programme was established during the period. Today, the Polytechnic has left its former temporary site to its permanent site which covers an area of 2,100 hectares. It has also witnessed rapid student intake and the creation of additional Schools and Department namely:-

1. **School of Business Studies**

   a. Banking and Finance

   b. Marketing

2. **School of Environmental Studies**

   a. Quantity Survey

   b. Building Technology

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3. **School of Engineering Technology**

   a.   Electrical & Electronic Engineering

   b.   Mechanical Engineering

   c.   Agric Engineering Technology

   d.   Chemical Engineering Technology

4. **School of General and Applied Sciences**

   a.   Computer Science

   b.   Statistics

   c.   Science Laboratory Technology

1.7   <u>PHILOSOPHY AND OBJECTIVES OF THE</u>
<u>INSTITUTION</u>

The Polytechnic is a higher institution of learning set up primarily to produce lower and higher level technical manpower for the national economy. Its philosophy is derived from the National Policy of Education and is based on "the development of the individual into a sound and effective citizens". To achieve this, the institution:-

i. Aspires to create a conducive environment with all the necessary ingredient to make its products well trained persons with a view to making them total persons which lead to effective contribution to the development and as growth of the country.

ii. Is empowered to develop, construct and manage land, buildings and other physical infrastructure.

CHAPTER TWO

2.0   **LITRATURE REVIEW**

2.1   <u>**HISTORY OF COMPUTER NETWORK**</u>

A network is simply a collection of data communications hardware, computers, communications software and communication media connected in a meaningful group to allow users to share information and equipment. Therefore, a computer network basically is an inter-connection of autonomous computer system in order to enhance inter-communication and share resources.

Since the 18th century, one discovers that there has been a single and particular technology that has denominated each century. The 18th century was the time of great mechanical system coming up with the industrial revolution.

The 19th century brought the advent of the steam engine and since the beginning of the 20th century, it has been the technology of information gathering, processing and distribution. (Taneubaum 1996). This come up to be defined as simply information technology this was brought about the installation of World Wide telephone network of radio and television transmission and the birth and consequently the unprecedented growth of the computer industry and of course the launching of communication satellite.

The possibility of a national network became apparent in 1922 in the United States, when a New York city station broadcast a remote

signal from Chicago by Telephone lines. (Compton's Encyclopedia, 1998).

The first attempt at Networking was made when WEAF and WNAC, New York and Boston City stations respectively fed program to each other by telephones lines for simultaneous broadcast. (Compton's Encyclopedia, 1998)

Since then, networks had both cultural and commercial value as smaller stations were able to offer programs that they could not otherwise afford and lending artistes could perform at a centrally located station and be heard across the nation.

In fact, the National Broadcasting Corporation, NBC was established as the first national network (Compton's Encyclopedia, 1998) other network came after this but the last major network then was the Mutual Broadcasting System, MBS and began Operation in 1934 and was developed to radio programming. Although, the size of network at that time was small, as small as three components, growth continued to happen and the size of networks became bigger.

The advanced research project Agency network (ARPA NET) was formed and originally as a military network and it was part of the United States Department of Defence and it was exclusively for military operations. It opened to non – military users later in the 1970's when Universities and companies engaging in defence related researchers were allowed to access and it started to expand from there. Basically, what is now known today as the "internet", Which is the

international network of tens of thousands of business, Universities and researcher organizations, started with the arpa Net. (Zacker and Doyle, 1996).

The rate at which the internet is expanding today motivates the inference that by the end of the first two decades of the 21st Century, the entire civilized world and indeed the whole world will be on a network, thereby making it a global village.

2.2 CLASSIFICATION OF NETWORK

Networks will be discussed under two – major principles that become standards and these are:-

i. Classification based on orientation.

    a.   Peer – to – peer network

    b.   Client – sever or sever based networks.

ii. Classification based on transmission technology

    a.   Broadcast network

2.2.1 PEER – TO – PEER NETWORK

A peer – to – peer network is the one in which there are no dedicated servers among computers that make up the network, all the computers are equal, have the same status and operates at the same rate and therefore are known as peers.

Under this type of networks, each computer functions as both a client and server and each one has the status of administrator as each

user at each computer makes autonomous decision on which of its resources gets shared on the Network.

CONDITIONS FOR SETING UP PEER TO PEER NETWORK

Peer to Peer Network is of good choice in an environment where:-

- There are 10 users or fewer
- The users are all located in the same general area.
- Security is not an issue.

FACTORS THAT MAKE PEER TO PEER SIMPLE AND SMALL SIZE

i. Peer to Peer network are less expensive and reduces cost of both implementation and management.

ii. It does not need the same level of performance and security as regard to the operating system.

iii. It does not require extra cost of additional software in other to set up the network because Peer to Peer is networking and is already in – built to the operating system.

Figure 2.2.1
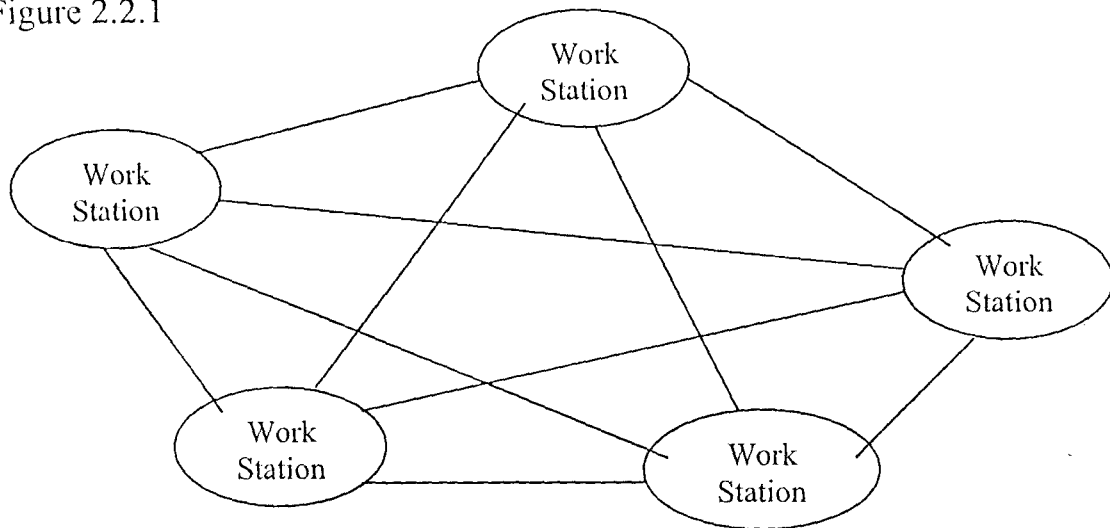
2.2.2. **CLIENT – SERVER OR SERVER BASED NETWORK**

In a client – server network, out of the numerous computers included in the network, one is singled out and made powerful enough to control the other activities to a large extent, this control includes the granting of access to shared resources like data, peripherals like printers.

In this client – server model, communication generally takes the form of a request message from the client to the server asking some work to be done. The server does the work and sends back the reply.

Figure 2.2.2
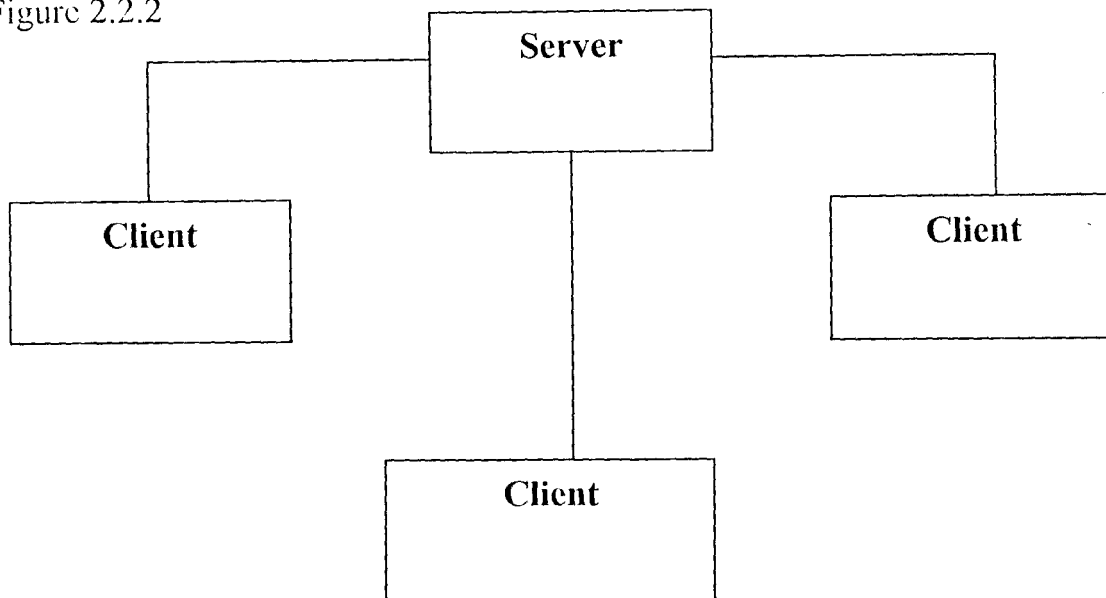
2.2.3   <u>BROADCAST NETWORK</u>

Broadcast network have a single communication channel which all computers in the network share, all the others receive messages sent by any computer but these messages always contain an address field, which specifies the particular computer for whom the message is intended.

Broadcast networks allow the possibility of addressing a packet to all computers through the use of a special code in the address field which will generalize the message. This is technically referred to as Broadcasting. Broadcast networks are identifies by the network technologies in places, for examples, the bus and ring topologies are good specification.

2.3   <u>TYPES OF COMPUTER NETWORK</u>

This is based on the geographical coverage or span of the network and the common type of network are LAN, MAN and WAN.

2.3.1   **(i) LOCAL AREA NETWORK (LAN):** This is the first type of network and is a system of hardware, software and communications channels that connects devices in close proximity or within a local geographical area. The distance separating devices in a LAN system may vary a few meters within a building to a few kilometers within the same city.

The LAN permits the movement of data (including text, voice and graphic image between mainframe computers, personal computers, terminals, inputs and output devices if connected to one another in order to share resources, such as printers and disk storage Due to the proximity of devices, the company, organization or an institution has to install its own communications channels (such as coaxial cable or optical fiber) for linking the computers. LAN is the smallest network size, has small error counts and inexpensive in price.

2.3.2. **(ii) METROPOLITAN AREA NETWORK (MAN):** This type of network has a communication range that spread across a city or a state .It is usually made up of two (2) or more LANS which are connected together. MAN covers a large area than a LAN. It is slower than LAN, but faster than WAN, it is very expensive and the error rates are moderate.

2.3.3. (iii) WIDE AREA NETWORK (WAN) This type of network has a communication range that spread across countries and condiments. Its equipment are very expensive its slower than LAN speed and it has highest possible of error rate.

2.4   NETWORK CONNECTIVITY (TOPOLOGY)

This physical layout of network is know as the network topology. This topology determine the type of arrangement of the computers, cables and other devices used on the network.

Types of topology

1.   BUS
2.   RING
3.   STAR
4.   MESH

2.4.1   THE BUS TOPOLOGY

The bus topology is the simplest and most commonly used. It connects all the computers in a row on a single cable, the cable is called "trunk" the backbone or the segment computers connected using a bus topology, communicate by attaching the address of the destination computer to the data being transmitted.

The data is sent on the cable in the form of a signal and this signal is sent along the bus to all the computers on the network, only

the computer whose address matches the address included in the signal accept it.

In a Bus topology there are 3 issue to consider and they are:-

i. Number of computer connected to the cable.

ii. Signal Bounce

iii. Terminators.

i. *Number of computer connected to the cable:-*The more computers on the network, the more traffic there will be on the network, these computers will compete with each other to send data because they can do so one at a time.

ii. *Signal Bounce:-* Signal bounce refers to as electrical property of sending data through a cable. If you do not have a device called a terminator on each end of the cable, an electrical signal will bounce back and forth along the cable, preventing all computers from sending data.

iii. *Terminators:-* A terminator prevents signal bounce. You need to have one at each end of the network cable.

Figure 2.4.1   **BUS TOPOLOGY**
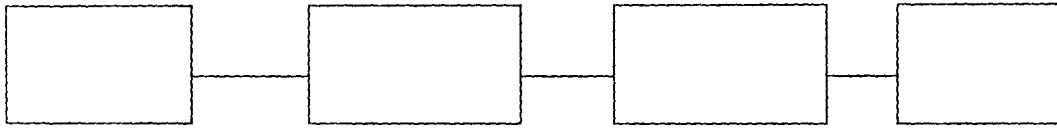
2.4.2   <u>THE RING TOPOLOGY</u>

In this type of topology, all computers are connected on a single ring cable. Data signal travels in one direction on the circle and passes through each computer until it finds the computer with the address that matches the address on the data signal.

Figure 2.4.2
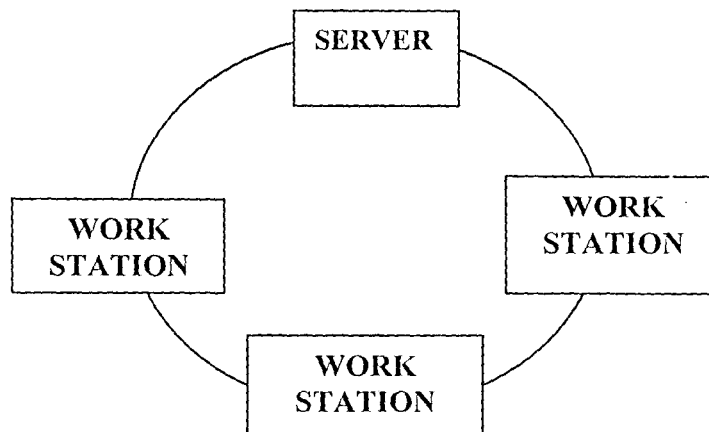
2.4.3   <u>THE STAR TOPOLOGY</u>

This type of topology has all the computers on the network connected to a centralized component called the switch or a Hub. The

Hub is an integral part of a star topology that are basically just multi-part repeaters for UTP cables, and they ranges in sizes.

There are three types of Hubs.

i. **ACTIVE HUBS:** Regenerate and re-transmit the data signal coming from the cable.

ii. **PASSIVE HUBS:** Acts as a connection points and do not amplify or re-generate the data signal coming from the cable.

iii. **FLYBRID HUBS:** Accommodate several different types of cables at the same time.

Figure 2.4.3
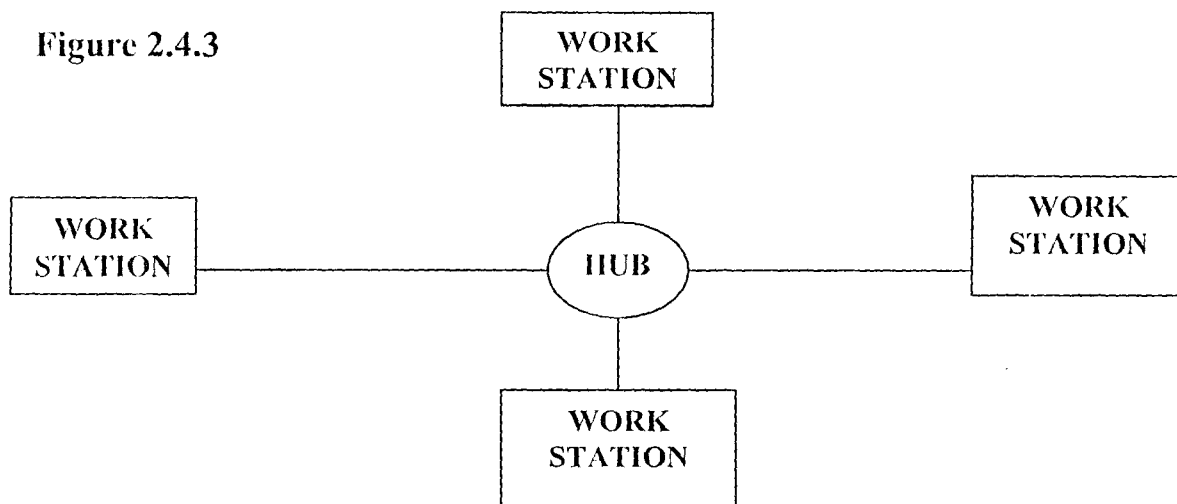
2.4.4 THE MESH TOPOLOGY

This type of topology is a combination of any of the two topologies mentioned above. Mesh topology are implemented in a large inter-network while Bus, Star, Ring are used in LANS.

There are two types of combination.

i.   Star – Bus

ii.   Star- Ring

Figure 2.4.4
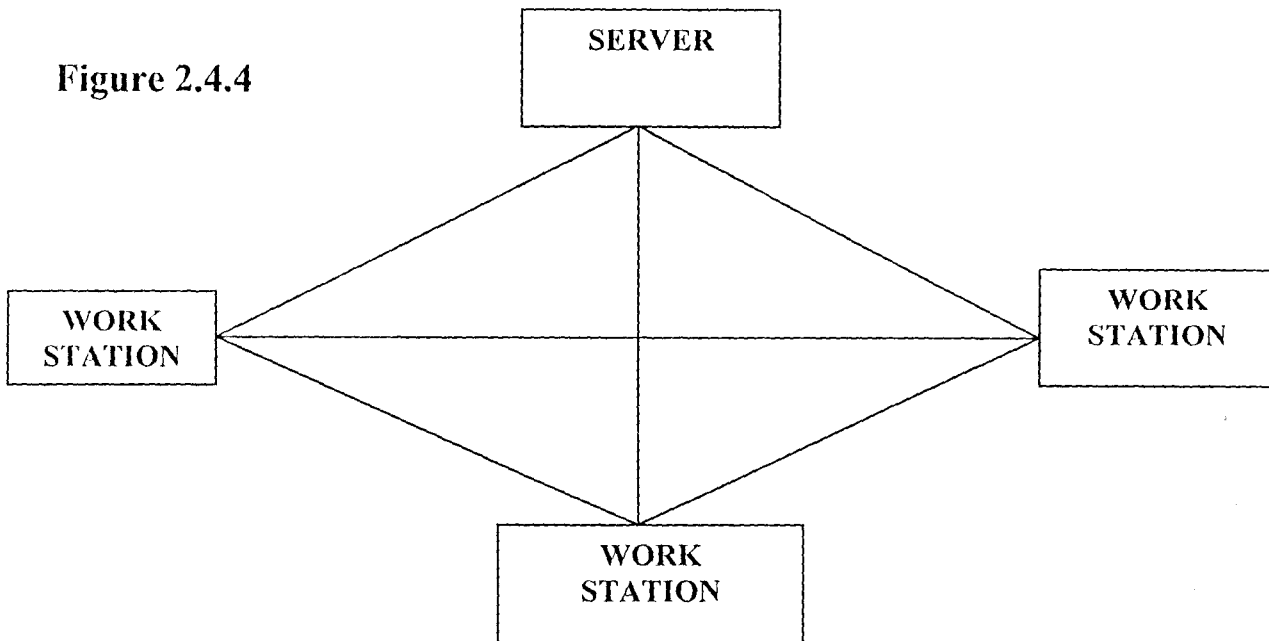
2.5   <u>PITFALLS OF DIFFERENT TOPOLOGIES</u>

Different topologies present different problems.

In a bus topology:- If there is a break in a cable on the network, the entire network will fail and everyone on the network will loose connectivity. This is due to signal bounce and if a terminator loose or is lost, the entire network will fail.

Star Topology:- If the Hub drops a given connection, the other connection will remain functioning, however, if the Hub is an Active one and it looses power, then the entire network segment will fail.

Ring Topology:- If there is a break in a cable then the rest of the connections on the network will remain functioning.

Mesh Topology:- Apart from the problems that arise from the Ring, Star and Bus topology, the main draw back is that it is difficult to install and manage.

2.6   NETWORK OPERATING SYSTEM (NOS)

An operating system (OS) controls the flow of programs, input/output devices, and manages the storage facilities of the computer.

Operating system are classified into:-

i. *Single User:-* Allows one program on job at a time such as MS – DOS.

ii. *Multiple Users:-* Allows multiple jobs to be performed simultaneously on a single host machine through terminals, such as Unix operating system.

iii. *Distributed Network Operating System:-* Are the class of operating system that allows simultaneous access and share resources of a single machine (usually called the server by multiple users e.g. Novel and windows NT.

FUNCTIONS OF NETWORK OPERATING SYSTEM

1.   *RESOURCE SHARING:-* Network operating system enables easy sharing of network resources (such as Printer, Memory e.t.c.) among many users simultaneously. This increasing resources availability and utilization.

2.   *PROVISION OF VIRTUAL MACHINE:-* Network Operating System (NOS) transform a raw piece of hardware into virtual machine which enables:

   - Larger memory:- Secondary memory can be easily use and shared by many users to give them the illusion of a single larger memory.

   - Easier input/output usage virtual machine which is made possible by the Nos, relievs the users in a network complex burden of input/output operations.

   - Protection and Error Handling:- Hardware and Nos enable a virtual machine to protect network resources against sharing collision and errors.

2.6.2   FACTORS TO CONSIDER WHEN CHOOSING A NETWORK OPERATING SYSTEM

i.   *Application service:-* The Nos should be able to meet the application requirement of the users. It should be able to support all the application packages and customized programs to be used on the network.

ii.   *Directory services:-* Also a good Nos provides robust facilities to keep track of users and resources in a central management form, such as domain name system (DNS) used by Windows NT.

iii.   *Security:-* Network accessed security facilities supported by a NOS to keep network intruders from unauthorized access to vital information on the network. Novell netware is an example of NOS with good network security system.

Some popular Network operating system are:-

i.   Unix – Based network operating system.

ii.   Novell netware operating system

iii.   Windows NT operating system.

2.7   BUILDING A LOCAL AREA NETWORK

Basically, there are some steps/procedures of which need to be embarked upon if the institution want to build local area network, assuring a site has been allocated to build a LAN.

2.7.1 *(I)   SURVEY*

Surveying of a computer network site is the first activity to be embarked upon when building a computer network. Observations of where client(s) and server(s) are going to be located are made, the trunk route is also observed.

2.7.2 (II)   _DESIGN AND COSTING_

For an effective computer networking design, materials like civil work plan showing entire measurement on site. This will include wall, window and door measurements and electrical design showing the measurement and layout of electrical route and fittings are required.

It is from the layout design that the institution will now calculate total length of trunk, cable and accessories required for the job.

2.7.3 (III)   _PRESENTATION_

The layout design, system specification and cost implication are being presented to be determined.

2.7.4 (IV)   _TOOLS AND ACCESSORIES_

PVC Trunks:- This are used generally for protecting the cable physically.

WALL PLUGS:- This are used to hold tight the screw that holds the trunk.

DRILLING MACHINES & DRILL BIT:- These are used in drilling in – between walls and drilling holes for the wall plugs to be inserted.

SCREWS & SCREW DRIVER:- Used to drive in screws a hold the trunk firm.

HAND SAW:- This is used basically for cutting trunk.

TAPE RULE:- This is used for measurement before cutting trunk.

CATEGORY 5 UTP CABLE:- It serves as the media of the network.

RUBBER CAPS:- This is used to cover neatly the point.

2.7.5 IMPLEMENTATION

1. *TRUCKING OF SITE:-* This involve the uses of drill, wall plugs screws, screw drivers, hand saw and trunks. The trunk can be laid in the roof, under the roof and above the floor depending on the site.

2. *CABLING OF SITE:-* Cables are being ran inside the trunk laid from each point at which wall socket outlets are identified to the point where the patch panel and hubs are situated.

iii) Installation of Accessories

iv) Patch cable creation

2.8 NETWORK MANAGEMENT

Network managerial involves the day – to –day running and supervision of a working network to ensure that its continues to run smoothly and that the components on the network and indeed the entire network perform optionally. The effective management of a network is very vital in the sense that one have to check the application whether is loading and printing correctly and at the same

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time see to how it is loading from the file serves whether the printers adapter is working properly.

2.8.1 FEATURES OF NETWORK MANAGEMENT PLATFORM

(i) *FAULT DETECTION:* This is the ability to detect and report on faults in the network. It is also attractive for the management system to be able to act in a stereotyped manner in response to a fault. For example if there is a disable communication between the server and the printer that is not printing correctly.

(ii) *CONFIGURATION MANAGEMENT:-* This is the ability to effort remotely the configuration of a managed physical or logical device.

(iii) *SECURITY CONTROL:-* This is the ability to control access to device and resources on the network from the central network management flat form.

(iv) *PERFORMANCE ANALYSIS:-* This is the ability to thoroughly analyse performance statistics for the purpose of trend analysis and capacity planning.

(v) *ACCOUNTING:-* This is the collection of data concerning who is using the network, how much of the network is being used and for what purpose.

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2.8.2   <u>NETWORK BOTTLENECKS</u>

The network activities involves the lord mated activity of several devices. To achieve device taking a certain amount of time to perform. its part of the transaction. Poor performance results when one of these devices uses noticeably more CPN than the others, the problem device is usually referred to as a Bottleneck.

Most performance monitoring is involved with identifying and eliminating bottlenecks, to salve bottlenecks problem an administration must be able to identify the devices that are taking more time than they should to perform their tasks. These devices are;

- CPU

- Memory

- Disk controllers

- Network media

2.8.3   <u>REASONS FOR PROBLEM DEVICE TO BECOME BOTTLENECK.</u>

- It is not being used as efficiently as it could.

- It is using other resources or CPU time more than it should.

- It is too slow

- It does not have the capacity to handle the load placed on it.

2.8.4   <u>ENSURING NETWORK DATA SECURITY</u>

In a networking environment there must be assurance that sensitive data will remain private so that only authorized users can

access it Not only as it important to secure sensitive information, it is equally important to protect network operations, Every network needs to be kept safe from deliberate or unconditional damage. However, a good network administrator will remember that security requires a balance. A network does not need to be so secured that people have difficulty in using it to get their work done.

Four major threats to the security of a network are:-

i.   Unauthorised access or copying of data stored on the server.

ii.   Power fluctuation

iii.   Theft

iv.   Intentional or unintentional damage.

2.8.5   LEVEL OF SECURITY

The extent and level of the network security system will depend on the type of environment in which the network is running.

2.8.6   PHYSICAL SECURITY OF EQUIPMENT

First consideration in keeping data safe is the physical security of the network hardware, the degree of this security will depend on:-

-       The size of the institution
-       The sensitivity of the data
-       The availability resource

2.9   <u>DATA BASE MANAGEMENT SYSTEM</u>

A database is an organized and integrated collection of Data base management system (DBMS) will store the data and the data relationship on the backing storage devices. It must provide an effective means of retrieval of that data when the applications require it, efficient data retrieval may be accomplished by computer language written in conventional programming languages such as Cobol and Fortran.

DBMS can be defined as software packages, which manage large, and complex file structures. DBMS make database available to a large number of users and the share of data can reduce the average cost of data access.

<u>BENEFITS OF DATA BASES</u>

1.   ***Reduces Data Duplication:-*** Large organizations and companies had for some time been putting large amounts of data onto their computer systems. The same data was being collected, validated, stored and accessed separately for a number of purposes.

With reduced data duplication data can be stored but it is essential that good integrity and security features operate in such systems and each application should run unaware of the existence of others using the database.

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2. *Increase Speed of implementing systems:-* Systems ought to be implemented in less time, since systems development staff can largely concentrate on the process involved in the application rather than on the collection, validation, sorting and storage of data.

3. *Ease file Access by Programmers:-* DBMS used well – known programming languages such as COBOL and FORTRAN as the language which was used to access base.

4. *Increase Data Integrity:-* With so many users accessing the DB, there must be some control to prevent failed transactions leaving the database in an inconsistent state, there must be proper mechanisms to control access by unauthorized users, these requirements will be easier in effect in a database environment than one where each application sets up its own files because of the possibilities of central administration, standards need only be agreed and set – up once for all users.

5. *Provide a management view:-* Manager were becoming aware of the need for a corporate view of their organisation such a view requires data from a number of departments, divisions and this corporate view cannot be gained if files are established on an application basis and not integrated as in a database.

6.   *Improve standards:-* With a central database, it is possible to impose standards for file access and update, and to impose good privacy and security features.

7.   *Increase Data independence:-* Data independence is the ability to change the format of the data or the medium on which the data is held on the data structures without having to change the programs or files which use the data. This separation of the issues concerning processes from the issues concerning data in a key season for an organisation opting for Data – base solution.

2.10   THE COMPUTER VIRUS

DEFINITION

A computer virus is one kind of threat to the security and integrity of computer systems, a computer virus can cause the loss or alteration of programs or data and can compromise their confidentiality, a computer virus can spread from program to program, and from system to system without direct human intervention.

2.10.1   CATEGORIES OF VIRUSES

There are two basic categories of viruses:-

i.   File infector virus

ii.   Boot sector virus

FILE INFECTOR VIRUSES:- This attach themselves to regular executable program files and when the user executes these program the virus can execute and spread to other program file.

BOOT SECTOR VIRUSES:- This forcefully store itself in the first sector of a disk and move the original boot code to a different unused sector.

2.10.2 HOW CAN COMPUTER VIRUSES AFFECT AN ORGANISATION

The initial introduction of an infected program can occur through a large variety of channels including:-

i.   Software introduced into a used on the system by an outsider who had access to the system.

ii.   Software used in the home by an employee whose hone computer system is unknown to the employee itself is infected.

iii. Software purchased from a commercial software company whose production facilities are infected.

iv.   Software intentionally infected by a malicious or disgruntled employee.

v.   Any other time that a pieces of software (including programmes, operating system and so on) is created within the organization or brought in from any outside source.

2.10.3   <u>DAMAGES CAUSED BY COMPUTER VIRUS</u>

Damage cause by a computer virus normally measured by the amount of time it takes to bring back the computer system in the normal operation. The following definition are used in describing damage.

1) *TRIVAL DAMAGE:* This is said to occur when the user has only to get rid of the virus, there may be some visual effect.

(i)   *MINOR DAMAGE:* This is said to occur when the user has to replace some or all of his executable files from clean back up or re-installing the software.

(ii)   *MAJOR DAMAGE:* This is done by a virus that gradually corrupts data files, so that the user is unaware of what is happening.

(iii)   **MODERATE DAMAGE:** This is done when a virus trashes the hand disk or low level formats the driver. This is recoverable from the back up.

2.10.4   <u>SYMPTOMS OF KNOWN VIRUSES</u>

This are some of the things that only occurs once the virus is in place in a computer and it is triggered to perform its particular function. And therefore, the user should know how to watch for these.

1. Unexpected changes in the time or length of files particularly executable files.

2. Programs taking long time to start or running more slowly than usual.

3. Unexpected and unexplained decreases in the amount of available work station memory, or increases in areas marked.

4. Executable files unexpectedly vanishing.

5. Work station/PC's unexpectedly rebooting when certain previously – correct program are run.

6. Unusual things appearing on display including "scrolling" of odd parts of the screen, or the unexpected appearance of bouncing balls or odd message.

2.10.5   <u>VIRUS REMOVING PROGRAMS</u>

The following is a table of very efficient anti virus software programs and their manufacturers.

	ANTI VIRUS AND PROGRAM	MANUFACTURES
1	Mc Aff ee's virus scan	Mc Aff ee Associates USA
2	Dr Solomon Anti virus	S&S International England
3	Thunder byte Anti virus	Frans Veldman,
4	F-pot	Frisk International England

CHAPTER THREE

3.0   RESEARCH DESIGN AND METHODOLOGY

3.1   SOURCES OF DATA

The method adopted in getting important materials for the accomplishment of this project were mainly through primary and secondary sources of data.

3.1.1   PRIMARY DATA

In the primary sources the method of data collection were from observation and administration of questionnaires with selected respondents from Federal Polytechnic Nasarawa.

3.1.2   SECONDARY DATA

The secondary sources were carried out through the use of relevant textbooks, publication of Federal Polytechnic Nasarawa, seminar papers presented and other documents.

3.2   POPULATION OF THE STUDY

The population of the study is to some selected senior and junior staff of Federal Polytechnic Nasarawa.

3.3   RESEARCH METHOD

3.3.1   RESEARCH INSTRUMENT

A)   The major instrument used is the questionnaire. The researcher also get data for the study through observation.

PROCEDURE

OBSERVATION:- This involved the visitation to various schools which consists of various department and units of Federal Polytechnic Nasarawa to examine the system unit and what they do with the system unit.

QUESTIONNAIRE:- Questionnaire were administered to some selected senior and junior staff of Federal Polytechnic, Nasarawa. This was presented in percentage and the responses from questionnaire were reduced into percentage tables.

B)   The information need of the various schools, departments and units were analysis to design the data base files for the server.

C)   Survey of site of Federal Polytechnic Nasarawa to determine where the clients and servers are going to be located.

3.4   QUESTIONNAIRE DESIGN

The design of the questionnaire for this study was divided into two sections. The first part is the Bio data and the second part is the main subject matter consisting eleven close ended and one open ended questions aimed to design a relevant information on the subject matter of the research.

3.5.1   <u>ADMINISTRATION OF QUESTIONNAIRE</u>

A total number of 30 questionnaire all typed were administered by the researcher to the selected staff of Federal Polytechnic Nasarawa.

The staff were met in their working environment during official hours. The questionnaires were distributed to them and responses was collected back a week later. All the 30 questionnaires distributed were returned.

3.6   <u>ANALYSIS AND DATA PRESENTATION</u>

Percentage tables were used to analyse the data that were collected and the inter presentation of the percentage tables were given in chapter four of this project.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 LEVEL OF COMPUTERISATION AS IT AFFECTS EFFICIENCY

4.2 AVAILABLE HARD WARE

The major computer hard wares that are available are basically for micro computer (PC units) in various offices.

There are also system units posted in the computer laboratory of the computer department used for practical by students and some in the MIS unit for processing information.

Table 4.1 gives the analysis of responses from the questionnaire in respect of the type of computer system in use in the Polytechnic.

Table 4.1-type of computer system in use

COMPUTER SYSTEM IN USE	NUMBER OF RESPONDENTS	PERCENTAGE OF RESPONDENT
Mini computer	-	0
Micro computer	30	100
Mainframe computer	-	0
Super frame computer	-	0
None	-	0
Total	30	100

From table 4.1, the 100 percent of the respondent indicated that the micro - computer is the only type of computer system that is in use in the Federal Polytechnic Nasarawa.

Table 4.1 of the analysis of the responses from the questionnaire pointed out that microcomputer is the only type of computer system that is in use in the Federal Polytechnic Nasarawa.

The Heads of Department are given these microcomputers and other peripheral device like printers. There are two types of printers that are in use in the offices. The majority used one is the Epsom 2180 which is basically used to print students results.

Table 4.2 Type of printer that is use now in the Polytechnic.

TYPE OF PRINTER IN USE	NUMBER OF RESPONDENT	PERCENTAGE OF RESPONDENT
Inkjet series	10	33
Epsom 2180	20	67
Total	30	100

From table 4.2, the 67 percentage of the responses from the questionnaire indicate that the Federal Polytechnic Nasarawa have make use of the Epsom 2180 printer and 33 percent of the responses indicated inkjet series, and non responses to the use of line printer.

The analysis from the responses in table 4.7 below reveals that the hardware resources are not adequate for the use of the Polytechnic community.

Table 4.7 gives the analysis of the responses from the questionnaire on the adequacy of the computer hard ware recourses the Polytechnic.

Table 4.7   <u>**Rate of adequacy**</u>

RATE OF ADEQUACY OF COMPUTER HARDWARE RESOURCES	NUMBER OF RESPONDENT	PERCENTAGE OF RESPONDENT
Very adequate	-	0
Adequate	8	27
Not adequate	22	73
Total	30	100

From table 4.7, the 73 percent of the responses indicated that the rate of adequacy of computer hardware resources is not adequate, 27 percent of the responses indicate that it is adequate and no responses on the very adequate check box.

4.2.2　　　　AVAILABLE SOFTWARE

Since the Polytechnic use microcomputer, the major operating system are Diskette operating system and window operating system particularly Microsoft window 95 and window 98.

Table 4.3 contains the analysis of responses from the questionnaire in respect of the kind of available soft ware that are mostly in used.

Table 4.3 kind of available software that is in use

KIND OF AVAILABLE SOFTWARE MOSTLY IN USE	NUMBER OF RESPONDENT	PERCENTAGE OF RESPONDENT
Word processing application programme	14	47
Spread sheet application programme	8	27
Graphic application programme	3	10
Data base application programme	5	16
Total	30	100

From table 4.3, 47 percent of the responses from the questionnaire indicated that the Federal Polytechnic Nasarawa make use of word processing programme over other application programme. Spreadsheet application has 27 percent responses, data base application programme have 16 percent of responses and graphic application programme has 10 percent of the responses.

Responses from table 4.3 reveals that all the computer system units are installed with many application programmes of which the federal polytechnic make use of word processing application programme over other application programme in the system. The applications that includes lotus 123 series and Microsoft excel, graphic application program that includes auto card 2001.

Table 4.4 gives the analysis of the responses from the questionnaire in respect of how the Federal Polytechnic Nasarawa source for the available software they are using.

Table 4.4 SOURCES OF THE AVAILABLE SOFT WARE

SOURCE OF THE AVAILABLE SOFTWARE	NUMBER OF RESPONDENT	PERCENTAGE OF RESPONDENT
Through supplier installation	30	100
Through purchases by the polytechnic	-	0
Through personnel sourcing	-	0
Total	30	100

SOURCE FIELD SURVEY 2001

From table 4.4, the 100 percent of the responses indicated that the available software the polytechnic is using is the one that was installed by the manufacturer. This has indicated that of the polytechnic has not source to design a soft ware that will be useful to suit their need.

Also responses from the questionnaire table 4.4 above revealed that the Polytechnic is still using the available software that is been installed by the supplier during the purchase of the computer system unit. No effort has been made to design another software of which will be suitable for the institution and no effort has been made by the purchased the already made software in the market.

This situation has results into inadequacy of software for the use of those officers with system units' table 4.8 below indicates this.

Table 4.8 gives the analysis of the responses from the questionnaire on the adequacy of computer software.

Table 4.1.8 Adequacy of computer soft ware

ADEQUACY OF COMPUTER SOFTWARE	NUMBER OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
Very adequate	-	0
Not adequate	12	40
Adequate	18	60
Total	30	100

SOURCE FIELD SURVEY 2001

From table 4.8, the 60 percent of the responses indicated that the computer software in the Federal Polytechnic Nasarawa is not adequate, 40 percent of the responses indicated that the software is adequate and no responses from the very adequate check box.

If particular software needed by an officer is not in his own system unit, he will search for it in another location having the software. This situation can be solved by sharing software resources among local area networking..

4.3   MAJOR OPERATIONS THAT HAS BEEN COMPUTERISED

The only area operations of the Polytechnic that have been computerized are in the area of word processing of documents, result processing and training the students.

Table 4.6 gives that analysis of the responses from the questionnaire on the uses of the computer in the Federal Polytechnic.

Table 4.6   Uses of the Computer

USES Of THE COMPUTER	NUMBER OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
Word processing of document	12	40
Training of students	6	20
Design	-	0
Exam. result. processing	12	40
Total	30	100

From table 4.6, 40 percent of the responses indicated that the Polytechnic make use of the computer majority on the area of word processing and 40 percent of the responses also indicated that Polytechnic make use of computers on the examination of result processing and 20 percent indicated that it is on the training of students and no responses on the design check box.

Table 4.6 above revealed that word processing of documents is the major operation; the officers of the polytechnic are involved within the use of their computer system units. The system units are used for typing of letters, minutes of meetings, memorandum and other documents related to their official assignment.

Also, examination result processing in a prominent word processing operation that Heads of Departments and Directors of Schools use their system units to do.

The analysis from the response from the questionnaire in table 4.1.6 also revealed that the limited aspect of training that had been computerized consist of 20 percent. This has to do with computer laboratory practical in which the students are involved in the use of computer system to run programmes.

4.3.1   METHOD OF RECORD KEEPING

The method of record keeping adopted by the Polytechnic is paper based method, the electronic method of record keeping has not been introduced in the Polytechnic, This was revealed in the Table 4.9 below.

Table 4.9 gives the analysis of the responses from the questionnaire on the method of record keeping adopted by the Federal Polytechnic Nasarawa.

Table 4.9 Method of Record keeping

METHOD OF RECORD KEEPING	NUMBER OF RESPONDENT	PERCENTAGE OF RESPONDENT
Paper based	30	100
Electronic based	-	0
Total	30	100

SOURCE FIELD SURVEY 2001

From table 4.9, the 100 percent of the responses indicated that the only practicable method of record keeping in Federal Polytechnic Nasarawa is paper based while no response to the electronic based method..

Since there is no any other method of record keeping apart from paper based, the method has results into the following difficulties.

1. Duplication of information by various department.

2. Large storage area for files and file cabinets.

3. Much effort and time in retrieval of information.

4. Much effort in updating information.

4.5

INFORMATION NEEDED BY SCHOOLS, DEPARTMENTS, AND UNITS OF THE FEDERAL POLYTECHNIC NASARAWA

The academic programmes are organized under nineteen departments, in four schools and there are also eight units and divisions within the polytechnic. The information need of the section and the department will be discussed under Rectory, Registry, Bursary, Library, Works and Physical Planning and Academic Department.

RECTORY

As the Rector is the Academic and chief Executive Officer, he would need information from all other schools, department and units of the polytechnic. The information need will be categorized on brad based thus:-

1. Finance of the Polytechnic

2. Appointment and Promotion.

3. Students Admission and Enrolment.

4. Examinations, assessment and graduation.

5. Physical Development

6. Security Matters.

REGISTRY

The Registry is the chief Administrative officer of the polytechnic and he is responsible to the Rector.

Most of the information used includes:-

1. Appointment and promotion.

2. Students' admission and enrolment.

3. Students' examination records.

4. Staff and Students disciplinary matter.

5. Staff biodata and qualification record

6. Records of students' biodata qualification.

4.5.3 BURSARY

The bursar is responsible to the Rector for the financial operation of the Polytechnic. The major information needs of the Bursary are:

1. Financial proposal from the section and department

2. Records of personnel

3. Records of assets

4. Records of income

5. Records of expenditure.

4.5.4   LIBRARY

The major information needs of the library are:

1. Records of books and journals and other publications.

2. Records of books and publication request from the academic department.

4.5.5   WORKS AND PHYSICAL PLANNING DEPARTMENT

The major information needs of the works and physical planning department are:

1.   Records of existing/proposed development
2.   Records of general maintenance of the polytechnic property
3.   Records of physical assets of the polytechnic.

4.5.6   ACADEMIC DEPARTMENTS

The information need of academic departments include:

1.   Students records
2.   Students examination results record
3.   Departmental staff record
4.   Records of books and journals

4.5.7   DIRECTORS OF SCHOOLS

The information need by the Directors of schools are:

1.   Students records
2.   Students examination records
3.   Staff records
4.   Records of school assets.

4.6   DESIGNING OF DATA BASES

Based on the information need of the various departments the following databases are recommended for the use of their computer.

PERSONNEL DATA BASES

This will contain staff Bio data and appointment file.

STUDENTS RECORD DATA BASES

This will have students

1. Bio data file and qualification file

2. Students examination record file.

FINANCE AND ASSET DATABASES

This will contain the following files.

1. Income and expenditure file

2. Real estate asset file

3. Furniture asset file

4. Electronic equipment

5. General motor vehicle and machinery asset file

6. Workshop equipment file

7. Workshop machine file.

PUBLICATION DATA BASES

The following files can be created:

1. Books information file

2. Journal information file

3. Borrowers information file.

4.7   LOCATION OF SERVER AND CLIENTS

The spatial distribution of the buildings within the polytechnic has been the major facts that determine the distribution of the key personnel of the Polytechnic that are involved in its management. This has to do with the recommendation of the locations of the server and client.

Figure 2 shows spatial distribution of building and activities in the permanent site of Federal Polytechnic Nasarawa.

Ninety-five percent of the administrative sets up of the Polytechnic are located in the permanent site, the rectory; registry and part of works and physical planning are housed in the school of environmental complex.

The main administrative units that are located outside the environmental complex are parts of works and physical planning department and **NAS POLY CONSULT** office which are housed in one of the flat in the staff quarters located at about five hundred meters from environmental complex.

The polytechnic clinic and the students, Affairs office are located about six kilometers away from the permanent site. This situation will constrains the inclusion of the clinic in the network design as the distance as so great for cost effectiveness and proper functioning of the local area network..

All the academic activities of the Polytechnic are concentrated in the permanent site and they are located in the buildings of two schools – Environmental school complex and Engineering complex.

The library complex, which houses part of the academic activities, is located between environmental complex and engineering complex.

The library is about 50 meters to environmental complex and about 120 meters to engineering complex. As the location of the Library is strategic, it will be adequate for the location of the server for the Polytechnic.

The clients will then be located in offices of the Rector, Registrar, Bursar, the Librarian, the Mis unit member, the Head of departments, the Director of works and physical planning.

4.7 *TOPOLOGY FOR LOCAL AREA NETWORK DESIGN*

For a workable topology for an area network design in Federal Polytechnic Nasarawa.

The star topology will serve the institution effectively. With the organizational structure and institution map studied, it shows that star topology will be of immense to the institution in the area of the information need by schools, departments and units of the institution.

In terms of connectivity, all the computers on the network in the institution will be connected to a centralized Hub or concentrated using unshielded twisted pair (UTP) cables. Each computer is connected to a Hub, which in turn can be connected to another set of computer.

With the advantage of which the stars topology has over other topologies. If there is a break in any of the cables, connecting to the schools,

departments and unit, only the computers connected to the cable will fail to function while the rest of the computers on the network will function normally.

CHAPTER FIVE

5.O   <u>SUMMARY OF FINDINGS, RECOMMENDATION</u>
                <u>AND CONCLUSION</u>

5.1   **OVERVIEW**

This study has attempted to examine the problems and prospect of application of local area networking to computerization of administration of Federal Polytechnic, Nasarawa.

Questionnaire administration and observation methods were adapted in this study. Percentage tables and personal expression were used in data analysis and presentation.

The following sections contains the summary of findings, recommendation and conclusion.

5.2   <u>**SUMMARY OF FINDINGS**</u>

1.   The available hardware and software are not adequate for the use of the officers of the polytechnic.

2.   The needed applications programme by a particular officer are in most cases not in the computer system in the officers office but elsewhere.

3.   Word processing package is the commonly used application programmes.

4.   Computer literacy level is low among the officers of the Polytechnic most of the gained computer literacy is organized

workshop which may not be adequate for the use of area networking.

5. The available computer hardware and software cannot support local area networking.

6. The existing method of record keeping is still paper based, that has problems of delay in retrieving information.

7. Local of director of medical service office outside the main campus about six kilometers will exclude the officer in charge from being included in the area networking.

5.3   <u>RECOMMENDATION</u>

The following suggestion may go a long way in solving the identified problems.

1. Sharing of hardware and software by introducing area network will go a long way in solving the problems of inadequacy of hardware and software in the polytechnic.

2. More hardware and software should be purchased to alleviate the problems of inadequacy and to upgrade the existing system to meet the need of the local area networking.

3.   The level of computer training of staff should be improved upon ,particularly in the area of networking to meet the challenges of its introduction.

4.   The existing method of record keeping should be computer based in which the data bases should be located in the library. This will reduce the problem of the existing method of record keeping.

5.   Relocation of the office of the Director of Medical Service and Student Affairs Officer to the main campus of the Polytechnic should solve the problem of their exclusion from local area network connectivity.

5.4   <u>CONCLUSION</u>

This study has identified the major problems that may be encountered in introduction of local area networking in Federal Polytechnic Nasarawa, to be inadequacy of software and hardware low level of computer literacy among the officers of the Polytechnic, location of some officers outside the main campus of polytechnic.

Nevertheless, the introduction of local area network in the Polytechnic, Nasarawa will go a long way in solving the existing problem of inadequate hardware and software by sharing resources, delay in retrieval of data by introduction of data base in keeping records, redundancy of information, low information integrity.

It is hope that the management of Federal Polytechnic, Nasarawa could benefit from the recommended solution to the identified problems.

9   SARAH E.HUTCHINSON AND
     STACEY C. SAWYER (1998)   Computer: the user
                                      perspective

10. SHMANG D.S. (2001)   Seminal presentation on Building a
                                     Computer Network at Department of
                                     Computer   Science.   Federal
                                     Polytechnic, Nasarawa.

11. STALLINGS W. (1987)   Local Networks Second Edition
                                     New-York, Macmillian.

APENDIX 1.

QUESTIONAIRE DESIGN

FIRST PART

Name:-

Rank:-

Department / Unit:-

SECOND PART

HARDWARE

1. **What is the type of Computer System you are using?**
    Please check as appropriate

    (a) Mini -- Computer   ☐
    (b) Micro - Computer   ☐
    (c) Mainframe – Computer   ☐
    (d) Superframe –Computer   ☐
    (e) None   ☐

2. **What are the type of Printer that you have and use ?**
    Please check as appropriate

    (a) Inkjet Series   ☐

    (b) Epson 2180 (Line Printer)   ☐

3. **What kind of Software do you think the school is using mostly in the Computer System?**
    (a) Word Processing Application Program   ☐
    (b) Spread Sheet application Program   ☐
    (c) Graphic Application Program   ☐
    (d) Data Base Application Program   ☐
    (e) Other's Specify   ☐

4. **How do you normally sources the Software you have?**
    Please check as appropriate

    (a) Through Hardware supplier installation   ☐
    (b) Through Purchases by Polytechnic   ☐
    (c) Through Personal sourcing   ☐

5. **Which of this Application Programmes do you normally use?**
    Check as appropriate

    (a) Word Processing   ☐
    (b) Microsoft word   ☐

(c) Word Perfect ☐

6. **Of what use do you normally put your Computer?**
   (a) Word Processing of documents ☐
   (b) Training of students ☐
   (c) Design ☐
   (d) Examination result processing ☐

7. **How would you have the adequacy of your Software?**
   (a) Very adequate ☐
   (b) Adequate ☐
   (c) Not adequate ☐

8. **How would you have adequacy of your Software?**
   (a) Very adequate ☐
   (b) Adequate ☐
   (d) Not adequate ☐

9. **What method of record keeping do you adopt?**
   Check as appropriate

   (a) Paper based ☐
   (b) Electronic based ☐

10. **What are the problem you normally have with your System of record keeping?**
    (a) Large storage area ☐
    (b) Duplication of information ☐
    (c) Delay in retrieval of information ☐
    (d) Delay in updating other information ☐

11. **Please list briefly the information you need in your day to day operation.**
    1
    2
    3
    4
    5
    6
    7

12. **How do you acquire Computer skill?**
    Check as appropriate

    (a) Through formal training ☐
    (b) Through Workshop ☐
    (c) On the job training ☐

APENDIX 2

```
                        ┌─────────────────┐
            ┌───────────┤     LIBRARY     ├────────────────────┐
         ┌──┤           └──┬────────┬─────┘                    │
         │  │              │        │                          │
┌────────┴┐ │           ┌──┴────┐ ┌─┴──────┐          ┌────────┴┐
│  HOOLS  │ │           │RECTORY│ │REGISTRY│          │M.I.S. UNIT│
└─────────┘ │           └───────┘ └────────┘          └───────────┘
            │
┌───────────┴─┐
│ DEPARTMENT  │
└─────┬───────┘
      │
┌─────┴───┐                              ┌──────────────┐
│ BURSARY │                              │   WORKS &    │
└─────────┘                              │ PHY PLANING  │
                                         └──────────────┘
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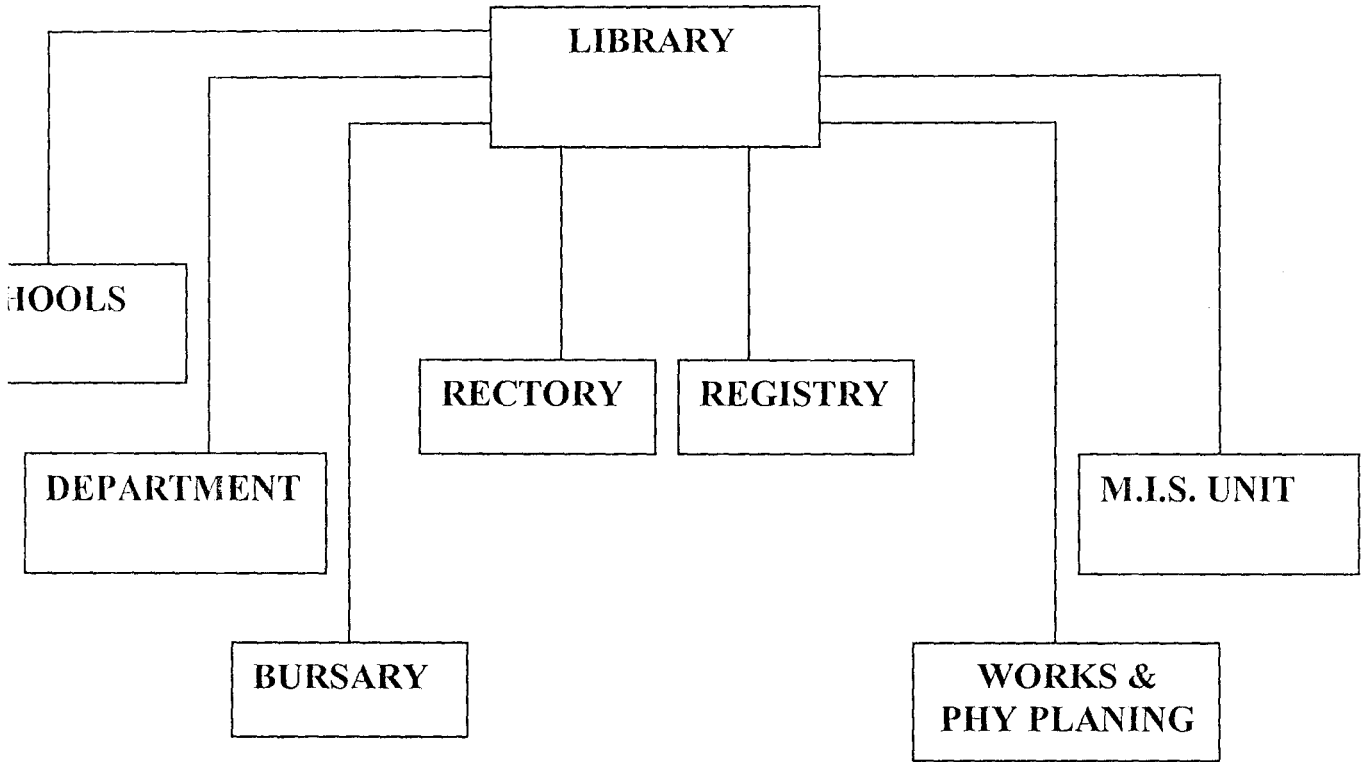
DESIGN OF SERVER BASED NETWORK FOR FEDERAL
POLYTECHNIC NASARAWA

APPENDIX 3

PSEUDOCODE FOR LAN TO DESCRIBE THE WORK ABILITY OF THE NETWORK.

STEP 1:   Files servers activated first

STEP2:   Work stations can start up

STEP 3:   Request made row is possible

STEP 4:   Search for Server

STEP5:   If found, response = Provide asses

        REPEAT 7

STEP6:   If not found

        REPEAT 1

STEP7:   Continue

        Endif

```
                    ╭─────────╮
                   (    Start   )
                    ╰─────────╯
                         │
                         │         ┌──────┐
                   ┌──────────┐    │
                   │ Initiate the │ │
                   │  Fileserver  │ │
                   └──────────┘    │
                         │         │
                        ╱ ╲        │
                       ╱   ╲  N    │
                   ╱ Is fileserver ╲──────┘
                   ╲  Activated    ╱
                       ╲   ╱
                        ╲ ╱
                         │
                         │ Y
                         │◄───────────────────────────┐
                   ┌──────────┐                        │
                   │ Request fund │                    │
                   │ Workstation  │                    │
                   └──────────┘                        │
                         │                             │
                        ╱ ╲              ╱ ╲           │
                   ╱ Is fileserver ╲  N ╱ Do you want ╲ Y
                   ╲  Located?     ╱────╲   to Try    ╱──┘
                       ╲   ╱           ╲  again?    ╱
                         │
                         │ Y
                   ┌──────────┐
                   │  Access is   │
                   │ Made open on │
                   └──────────┘
                         │
                    ╭───────╮         ╭───────╮
                   ( Close )─────────( close )
                    ╰───────╯         ╰───────╯
```
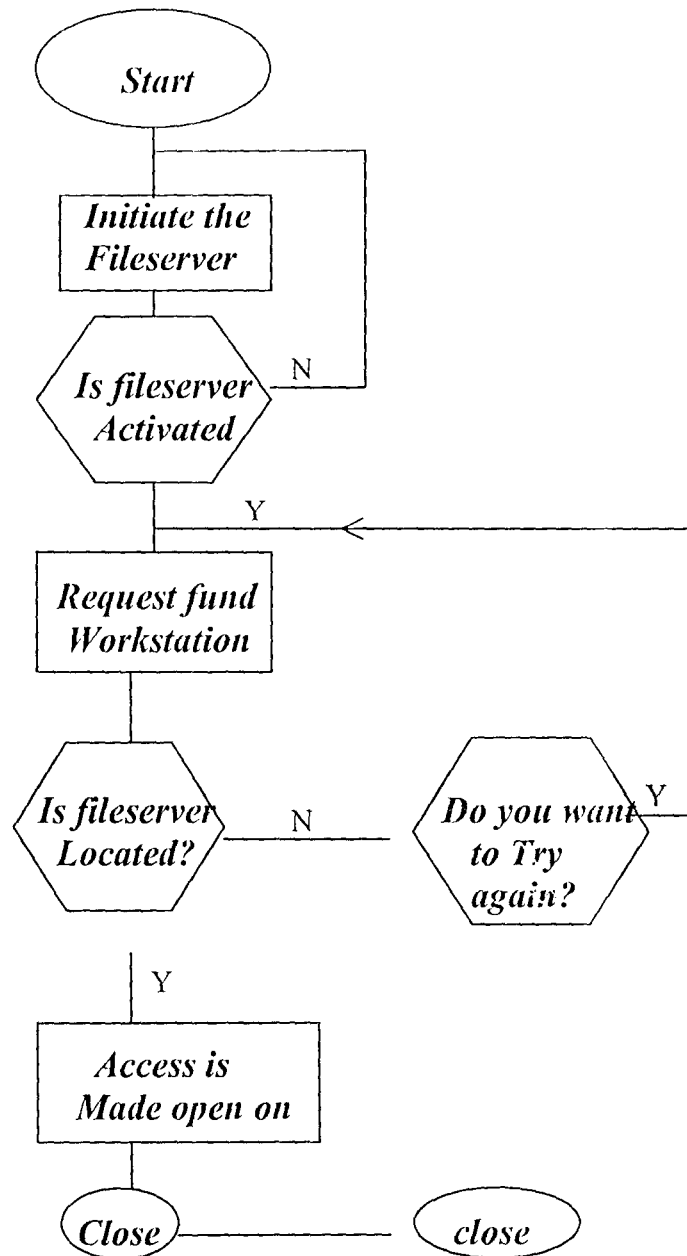
Flowchart for workstation of the network