# It report on networking

CHAPTER ONE 1.

0INTRODUCTION 1. 1BACKGROUND SIWES was established by ITF in 1973 to solve the problem of lack of adequate practical skills preparatory for employment in industries by Nigerian graduates of tertiary institutions. The Scheme exposes students to industry based skills necessary for a smooth transition from the classroom to the world of work. It affords students of tertiary institutions the opportunity of being familiarized and exposed to the needed experience in handling machinery and equipment which are usually not available in the educational institutions.

Participation in Industrial Training is a well-known educational strategy.

Classroom studies are integrated with learning through hands-on work experiences in a field related to the student's academic major and career goals. Successful internships foster an experiential learning process that not only promotes career preparation but provides opportunities for learners to develop skills necessary to become leaders in their chosen professions. One of the primary goals of the SIWES is to help students integrate leadership development into the experiential learning process.

Students are expected to learn and develop basic non-profit leadership skills through a mentoring relationship with innovative non-profit leaders. By integrating leadership development activities into the Industrial Training experience, we hope to encourage students to actively engage in non-profit management as a professional career objective. However, the effectiveness of the SIWES experience will have varying outcomes based upon the

individual student, the work assignment, and the supervisor/mentor requirements.

It is vital that each internship position description includes specific, written learning objectives to ensure leadership skill development is incorporated. Participation in SIWES has become a necessary pre-condition for the award of Diploma and Degree certificates in specific disciplines in most institutions of higher learning in the country, in accordance with the education policy of government. Operators-The ITF, the coordinating agencies (NUC, NCCE, NBTE), employers of labor and the institutions. Funding-The Federal Government of Nigeria Beneficiaries- Undergraduate students of the following:

Agriculture, Engineering, Technology, Environmental, Science, Education, Medical Science and Pure and Applied Sciences. Duration -Four months for Polytechnics and Colleges of Education, and Six months for the Universities.

1. 2 OBJECTIVES 1. SIWES will provide students the opportunity to test their interest in a particular career before permanent commitments are made. 2. SIWES students will develop skills in the application of theory to practical work situations.

3. SIWES will provide students the opportunity to test their aptitude for a particular career before permanent commitments are made. 4.

SIWES students will develop skills and techniques directly applicable to their careers. 5.

SIWES will aid students in adjusting from college to full-time employment. 6. SIWES will provide students the opportunity to develop attitudes conducive to effective interpersonal relationships. 7. SIWES will increase a student's sense of responsibility.

8. SIWES students will be prepared to enter into full-time employment in their area of specialization upon graduation. 9. SIWES students will acquire good work habits. 10. SIWES students will develop employment records/references that will enhance employment opportunities.

1. SIWES will provide students with an in-depth knowledge of the formal functional activities of a participating organization. 12. SIWES will provide students the opportunity to understand informal organizational interrelationships. 13.

SIWES students will have higher levels of academic performances. 14. SIWES will increase student earning potential upon graduation. 15. SIWES Students will be able to outline at least five specific goals with several staff members by comparing performance with job duties and develop a draft plan with staff to accomplish performance needs, supervision plan and rewards.

. 3BRIEF HISTORY OF THE ESTABLISHMENT OF ATTACHMENT The Information communication Department in the Governor's office was first established in 2003 as a unit by the then Governor of the State, Governor Donald Duke. In 2007 it became a Department with Nine Units namely, 1. Training unit 2. Maintenance unit 3.

Networking unit 4. Information system application 5. Audit unit 6. Account unit 7. PRS unit 8. Administration 9.

Support unit 1. 4BRIEF DUTIES OF EACH UNIT

TRAINING UNIT- this unit does the training of students in Computer literacy and also runs a certificate program in CCNA and project management, comptia A+ MAINTENANCE UNIT- This Unit is in charge of maintenance of all computer systems in the department NETWORKING UNIT- This unit is in charge of Network administration in the department and in all the MDAs and the Governor's office, this unit takes care of the states network affairs INFORMATION SYSTEM APPLICATION UNIT- This unit is in charge of the database of the establishment Support unit- this unit is in or supports the network unit in network administration.

GOALS Vision to be a leading ICT driven state in the country Mission to create an information rich, knowledge driven society RESPONSIBILITIES Is to make sure that we meet our client requirement and need in the various MDA and give them better service delivery CHAPTER TWO 2. 0 LITERATURE REVIEW

In the course of my training with the ICT Department in Governor's Office I was privileged to work with the support Unit which is in charge of administration of the Cross River State Network the Cross River State Network this works with the Database Center at the Governor's Office where the Network Operating Centre(NOC) is Located This Units is in charge of the network and makes sure that all Ministries Departments Agencies are

Connected to the network at all times, in case of Network breach the units does troubleshooting to rectify the problems as fast as possible. .

1NETWORK DOMAIN AND ADMINISTRATION. (SUMMARY ON THE CROSS RIVER STATE NETWORK) Cross River State Network uses a domain to organize the network environment. Domains are groups of PCs on the same network and are a method to isolate communications between the members in the domain and the other data traffic. Anyone in a domain can communicate with each other and out bound, however PCs not defined in the domain cannot communicate with those in the domain.

Basically the network starts from when the satellite in space sends radio signals down to the satellite dish receiver (ku-band, ka-band, c-band e.

t. c). This satellite dish receiver is connected to the private port of the internet modem then the public port of the modem is connected to the ISA server which acts as the gateway to internet access. The ISA server is connected to a domain controller which controls the domain environment by granting anyone who has a registered account on the domain access to the internet recourse.

I. e.

anyone who does not have an account or valid log on credentials cannot use the internet. Domain controller can also be used to control the network environment by restricting the rights to chance setting on the workstation so that only administrative rights can alter settings. The ISA server is also connected to an antivirus server which monitors the automatic updates and

downloading of update for all workstation in the domain with a specific antivirus used for the network installed on them.

The ISA server is also connected to a 24 port switch which is connected to the different switch cabinet in each directorate of office buildings (since it is a 24 port switch it take a maximum of 23 directorates, another switch can be connected to the first switch in case of more buildings). Ever building has a cabinet where LAN (local area network) connections are distributed to different offices. The cabinet comprises of switches and patch panels.

The patch panel is a device that is used as a repeater so that signals don't get loss over a long cable.

One of the cables that comes from the main 24 port switch goes to the patch panel then a RJ-45 cable is connected from the patch panel to the switch (mostly a 24-port switch) in the cabinet (in case of two switches we have two patch panels. ). The patch panel then distributes the connection in the office or to other offices in the building as LAN port where workstations can be connected to by the use of RJ-45 cable (workstations can also be connected directly to the switch). As for wireless connection, a wireless router or access point is placed at every passage way in each building.

The wireless access point is either connected to one of the switches in the cabinet or the main 24-port switch. 2. 2 ISA SERVER/PROXY SERVER/GATEWAY The ISA server also acts as a proxy server/gateway. A proxy server is a server that acts as an intermediary between a workstation user and the Internet so that the enterprise can ensure security, administrative control, and caching service. A proxy server is associated with

or part of a gateway server that separates the enterprise network from the outside network and a firewall server that protects the enterprise network from outside intrusion.

An advantage of a proxy server is that its cache can serve all users. If one or more Internet sites are frequently requested, these are likely to be in the proxy's cache, which will improve user response time. A proxy can also do logging. A user on a workstation which is connected to the domain can only view the internet if the address and port number of the ISA server is set in the proxy address and port settings. 2. 3 HOW TO SET THE PROXY SETTINGS: •STEP 1: Click tools then click internet options on the browser.

STEP 2: Click on the connection tab and then click LAN settings. •STEP 3: Type in the ISA server ip-address (e. g. 192. 168. 2.

1) in the address box and also insert the port number (e. g. 3128). 2. 4 HOW TO JOIN A WORKSTATION TO A DOMAIN STEP 1: right-click on my-computer then clicks properties.

STEP 2: click on system properties. STEP 3: Click on computer name tab, click change. STEP 4: Type in the computer name (e. g. pro 10), then click the domain radio button and type in the domain name (e. g.

dpetri. net), then click ok.

STEP 5: After clicking OK you would prompt with a username and password dialog box where only those with administrative credentials would be able to logon. Type in the user name and password, and then click OK. STEP 5: After

clicking OK, you would be prompted with a dialog box welcoming you to the domain.

Then restart the system. 2. 5 ANTIVIRUS SERVER The antivirus server is a separate system that is connected to the ISA server. It is used to protect the network from harmful treats like spyware (i. e.

worm, virus, adware e. t. c. ).

The antivirus server makes use of windows server 2003 operating system, with a network antivirus (e.

g. e-trust) installed on it. For any workstation on the network to be protected by the network antivirus server a copy of the network antivirus must be installed on them. To make the antivirus copy work with the antivirus server the proxy settings must be set using the antivirus server Ip-address (e. g. 192.

168. 2. 4) as the address in the proxy settings. 2. 6 MAIN SWITCH The main switch is a switch that is used to distribute the network connection to different buildings.

A switch is a device that is used to link systems or workstations together. A switch is mainly used in a star topology. Properties of a switch: •Collision: this is the jamming of signal in a transmission medium. •Collision domain: this is the environment in which collision occurs. • Broadcast: this is the sending of signal from a system to the rest of the system connected to the switch. A broadcast is usually sent across all the collision domains as one virtual domain.

•Broadcast domain: this is the environment in which a broadcast is sent across. Multicast: this is the sending of signal from one system to a selected group of systems connected to the switch. •Unicast: this is a signal that is sent from one system to another. 2. 7PATCH PANEL A patch panel is a panel of network ports contained together, usually within a telecommunications closet that connects incoming and outgoing lines of a LAN or other communication, electronic or electrical system. In a LAN, the patch panel connects the network's computers to each other and to the outside lines that enable the LAN to connect to the Internet or another WAN.

Connections are made with patch cords. The patch panel allows circuits to be arranged and rearranged by plugging and unplugging the patch cords. The use of a patch panel is necessary because is help to repeat signals travelled over a cable from a long distance to prevent data loss. A patch panel is connected to a switch respectively according to the number on each port of both the switch and patch panel. 2.

8 ROUTER/VPN A router is a device or a computer that is used to connect two or more networks together. Routers are physical devices that join multiple wired or wireless networks together.

Technically, a wired or wireless router is a Layer 3 gateway, meaning that the wired/wireless router connects networks (as gateways do), and that the router operates at the network layer of the OSI model. A router can also be called a computer because it has a LAN-port, an operating system (OS) and memory. A router has an operating system and a user interface (depending

on the brand of the router). The user interface can be viewed by connecting the router via LAN-cable to a computer.

2. 8 STEPS TO VIEW THE USER INTERFACE OF A ROUTER: Know the default IP-address of the router (usually 192. 168. 0. 1). •Connect the router to a computer.

•Open a browser. •Click on the file tab. •Click on open then a dialog box appears. • Type in the IP-address of the router in the text box and click OK, then a logon dialog box appears. The default username and password are both admin and admin.

• Type in the username and password then click OK. In the user interface you can change the Ip-address to suit your company setting, change the security protocol (i. e. either WAP, WAP2, WEB e. t.

c), router name e. t. VPN: A VPN (virtual private network) is a device that uses a series of encryption and algorithms to secure the data transmitted over the public internet. It allows users to work on their company network from their home with a higher level of confidence that no one else can access their work i. e.

it provides a level of encryption so that an outsider would not be able to hack in to the network. VPN eliminates distance between two computers and establish a secured connection with two computers. A VPN can also act as a router in the sense that it can be used for connecting two or more networks together.

CHAPTER THREE 3. 1HARDWARE AND MAINTAINNACE During the course of training I was also fortunate to receive lectures and training on comptia A+ that is hardware and maintenance which covered Knowledge on system maintenance as a whole approaches on how to prevent system damage.

A computer system basically contains the following components/devices: System case, Mother board, Processor, Memory, Graphics card, Sound card, Modem, NIC Card, Hard disk CD-ROM/DVD-ROM Monitor. SYSTEM CASE: A system case is required to hold all your components together. It houses all the internal component of a system.

The system cases come in two form factors which are AT and ATX. Nearly all the cases made nowadays are ATX as the motherboard manufacturers make majority of their motherboard in the ATX form.

MOTHERBOARD: A motherboard is the central printed circuit board (PCB) in a computer that holds many of the crucial components of the system, while providing connectors for other peripherals. The motherboard is sometimes alternatively known as the main board, system board. PROCESSOR: The processor (CPU, for Central Processing Unit) is the computer's brain.

It allows the processing of numeric data, information entered in binary form, and the execution of instructions stored in memory. The Central Processing Unit (CPU) is responsible for interpreting and executing most of the commands from the computer's hardware and software.

It is often called the " brains" of the computer. MEMORY: A memory is the name given to a silicon chips that stores volatile computer data. The word Volatile means that the contents of memory will be lost if the power of the

computer switched off. Memory stores some of your operating system and application data while it is being run.

The more memory you have in your computer the higher the amount of application you can run simultaneously, and will provide an overall better system performance.

Memory comes in different forms. The older system uses SDRAM, while Fig 3. 1 A typical system board The current system uses DDR-SDRAM (Double Data Rate Synchronous Dynamic Random Access Memory). Fig 3. 2 3. 2.

SYSTEM BOARD COMPONENTS Now that you understand the basic types of motherboards and their form factors, it's time to look at the components found on the motherboard and their locations relative to each other Figure 3. illustrates many of the following components found on a typical motherboard: * Chipsets * Expansion slots * Memory slots and external cache * CPU and processor slots or sockets * Power connectors * Onboard disk drive connectors * Keyboard connectors * Peripheral port and connectors * BIOS chip * CMOS battery * Jumpers and DIP switches * Firmware CHIPSETS A chipset is usually designed to work with a specific family of microprocessors. Because it controls communications between the processor and external devices, the chipset plays a crucial role in determining system performance.

The manufacturer of a chipset often is independent from the manufacturer of the motherboard. Current manufacturers of chipsets for PC-compatible motherboards include NVIDIA, AMD, VIA Technologies, Inteland Broadcom. There can only be two (2) chipsets in a computer namely Northbridge and

Southbridge. NORTHBRIDGE The Northbridge links the CPU to very high-speed devices, especially main memory and graphics controller's . The communications between the CPU and memory occur over what is known as the front side bus (FSB), which is just a set of signal pathways between the CPU and main memory.

The Northbridge chipsets also manage the communications between the Southbridge Chipset and the rest of the computer SOUTHBRIDGE Southbridge connects to lower-speed peripheral buses (such as PCI or ISA). In many modern chipsets, the Southbridge actually contains some on-chip integrated peripherals, such as Ethernet, USB, and audio devices.

A typical motherboard chipset for Pentium architecture. EXPANSION SLOTS The most visible parts of any motherboard are the expansion slots. These look like small plastic slots, usually from 3 to 11 inches long and approximately 1? 2 inch wide.

As their name suggests, these slots are used to install various devices in the computer to expand its capabilities. Some expansion devices that might be installed in these slots include video, network, sound, and disk interface cards.

If you look at the motherboard in your computer, you will more than likely see one of the Main types of expansion slots used in computers today: * ISA * PCI * AGP * PCIe Each type differs in appearance and function. In this section, we will cover how to visually identify the different expansion slots on the motherboard. ISA Expansion Slots

ISA bus first appeared in PC based on 80286 CPU. The idea was to put a standard in interfacing with peripheral devices. In our days this bus is kept for compatibility with " legacy" peripheral devices such as BIOS ROM, Parallel and Serial Ports, Sound and Modem devices.

These devices have historical fixed address range (no Plug and Play option) and aren't hurt by low speed of ISA bus (8/16 bit data bus with 8 MHz clock speed). Most modern PCs don't even have extra ISA slots since most peripheral components moved to PCI and USB. ISA bus requires 4 bus cycles for each data transfer. Fig 3. EXPANSION CARD AND SLOT PCI Expansion Slots PCI bus was developed by Intel for high performance peripheral devices, such as graphic accelerators, disk controllers, data acquisition boards. PCI was supposed to overcome limitations of existing ISA bus.

16 bit ISA bus with clock speed of 10 MHz with theoretical bus throughput 2M transfers/sec but practically not more than 500k. PCI bus is much faster: in burst mode PCI can transfer 32 or 64 bit data with 33 MHz or 64 MHz clock, that yields transfer rates from 132 MB/sec to 538 MB/sec, PCI supports huge address range: 32/64 bit address bus instead of 16 bit ISA.

It is a burst oriented bus designed for large transfers; hidden bus arbitration among multiple musters is provided on each bus. In theory up to 32 logical devices can reside on PCI bus. But practically, a PCI bus is more likely to have maximum 10 devices because of its low-powered, reflected wave-switching. If more devices is desired PCI to PCI bridge is used.

PCI devices are automatically configured in software (Plug and Play option). This eliminates earlier problems with ISA configuration using fixed addresses or user configured switches and jumpers.

In recent years some peripheral devices have gotten faster and PCI became too slow for CD and hard disks. Then new interfaces appeared: IDE, SCSI. Fig 3. 4 PCI expansion slot AGP EXPANSION SLOTS AGP port When 3D graphics applications became common, graphic devices were still found on the PCI bus.

AGP port provides high speed access to the memory and allows sharing it with local video memory. AGP is not a bus (no competition between devices sitting on the same bus), but port with a dedicated connection between North bridge and graphic accelerator.

Speed is 264 MB/s – 1 GB/s Fig 3. 4 An AGP slot PCI EXPANSION SLOTS The newest expansion slot architecture that is being used by motherboards is PCI Express (PCI). It was designed to be a replacement for AGP and PCI.

It has the capability of being faster than AGP while maintaining the flexibility of PCI. And motherboards with PCI will have regular PCI slots for backward compatibility with PCI. The diagram below illustrates Pentium IV system. You can see that ISA bus is gone and a new interface introduced: PCI Express. LPC is a subset of PCI (low pin count).

PCI Express provides advanced features such as better power management, performance and bandwidth increases, enables support for streaming media, TV tuners, cameras, graphics. POWER CONNECTORS In addition to these sockets and slots on the motherboard, a special connector (shown in allows

the motherboard to be connected to the power supply to receive power. This connector is where the ATX power connector plugs in. Fig 3. 5 An ATX power connector Central Processing Unit (CPU) and Processor Socket or Slot The " brain" of any computer is the central processing unit (CPU).

This component does all the calculations and performs 90 percent of all the functions of a computer. There are many different types of processors for computers—so many, typically, in today's computers, the processor is the easiest component to identify on the motherboard. It is usually the component that has either a fan or a heat sink (usually both) attached to it. These devices are used to draw away the heat a processor generates. This is done because heat is the enemy of microelectronics.

Theoretically, a Pentium (or higher) processor generates enough heat that without the heat sink it would self-destruct in a matter of hours.

Sockets and slots on the motherboard are as plentiful and varied as processors. Sockets are basically flat and have several rows of holes arranged in a square, as shown in Figure 1. 10. The processor slot is another method of connecting a processor to a motherboard, but one into which an Intel Pentium II or Pentium III–class processor on a special expansion card can be inserted. Fig 3.

6 Processors with a fan and heat sinks Fig 3. 7An example of a CPU socket Modern processors can feature the following: OVER CLOCKING: Over clocking your CPU offers increased performance, on a processor designed to operate at the over clocked speed.

However, unlike with the processor designed to run that fast, you must make special arrangements to ensure that an over clocked CPU does not destroy itself from the increased heat levels. An advanced cooling mechanism, such as liquid cooling, might be necessary to avoid losing the processor and other components. 3. 3 COMPUTER MEMORY Computer RAM is the best known form of memory your computer uses.

Every file or application opened is placed in RAM. Any information the computer needs or uses becomes part of a continuous cycle where the CPU requests data from RAM, processes it and then writes new data back to RAM.

This can happen millions of times a second. However, this is usually just for temporary file storage, so unless the data is saved somewhere, it is deleted when the files or applications are closed 3. 4 HARD DISK DRIVE A hard disk drive (HDD), commonly referred to as a hard drive or hard disk, is a non-volatile storage device which stores digitally encoded data on rapidly rotating platters with magnetic surfaces. Strictly speaking, " drive" refers to a device distinct from its medium, such as a tape drive and its tape, or a floppy disk drive and its floppy disk.

Early HDDs had removable media; however, an HDD today is typically a sealed unit with fixed media. Figure 3. 8 showing a Hard disk and its components. A hard disk drive stores information on one or more rigid, flat, disks. The disks are mounted on a spindle, with spacers in between, and a motor on the bottom end of the spindle. To read and write to the surface of the disks, the drive uses a small electro-magnet assembly, referred to as a head, located on the end of an actuator arm.

There is one head for each platter surface on the spindle. The disks are spun at a very high speed to allow the head to move quickly over the surface of the disk.

Towards the other end of the actuator arm is a pivot point, and at the end is a voice coil, which moves the head. Above and below each voice coil is a rare earth magnet. This allows the head to move towards the center of the disk or towards the outside, in a radial pattern.

Fig 3. 9 Describing inside the HDD 3. 5 PREVENTIVE MAINTENANCE OF THE HARD DISK DRIVE The preventive measures are used to improve the performance of the hard disk. The primary tools or utilities available are: Scandisk: This utility can be used to scan surface for media errors, scan files and folders for data problem.

Scan disk is run each time window is not properly shot down. You should run scan disk at least weekly to find and repair small error on disk before they become major problem.

Disk Defragmentation: This utility is use to rearrange your disk files, combined and organized unused disk space so that application run faster. As we modify or delete file on hard disk, file become fragmented. The defragmenter eliminates fragmentation so that data in the file are readily available to program asking for it. Disk Cleanup/delete Unused File: This utility remove unnecessary file from your hard disk.

This tool scan the disk you designate to fine files that can be removed without affecting the operation of the PC and the Window operating system.

Backup: Backing up hard disk data to another storage media that can be stored outside the PC is also a preventive maintenance. This usually prevent hard disk against failure, PC problem hardware can be replaced but most often data cannot be recovered, so making a backup copy of your file is a safety precaution that ensure that your data can be outlive on the device on which it is stored.

Empty Recycle Bin: The recycle bin should always be emptied at least monthly in order to remove all deleted data, file, programs that are no longer needed. 3. 6 FLOPPY DISK DRIVES Floppy disks, also known as floppies or diskettes (where the suffix -ette means little one) were ubiquitous in the 1980s and 1990s, being used on home and personal computer (" PC") platforms such as theAppleII, Macintosh, Commodore 64, Atari ST, Amiga, andIBMPC to distribute software, transfer data between computers, and create small backups.

Before the popularization of the hard drive for PCs, floppy disks were typically used to store a computer's operating system (OS), application software, and other data. Many home computers had their primary OS kernels stored permanently in on-board ROM chips, but stored the disk operating system on a floppy, whether it be a proprietary system, CP/M, or, later, DOS. Since the floppy drive was the primary means of storing programs, it was typically designated as the ' A:' drive. The second floppy drive was the ' B:' drive.

And those with the luxury of a hard drive were designated the ' C:' drive, a convention that remains with us today long after the decline of the floppy disk's utility.

Fig 3. 10 CD-ROM DRIVES Figure3. 10 showing Old 4x CD-ROM DRIVE CD-ROM discs are read using CD-ROM drives, which are now almost universal on personal computers. A CD-ROM drive may be connected to the computer via an IDE (ATA), SCSI, SATA, Fire wire, or USB interface or a proprietary interface, such as the Panasonic CD interface.

Virtually all modern CD-ROM drives can also play audio CDs as well as Video CDs and other data standards when used in conjunction with the right software.

3. 7 INSTALLING THE HARDWARE COMPONENTS OF A COMPUTER SYSTEM Things to get in place before starting: Set of screwdrivers and pliers, Piece of cloth, CPU Thermal compound (recommended), PC components. Make sure you have all the components in place and a nice, clean and big enough place to work with. Fig 3. 11 All PC components accept the case Tip: CPU Thermal compound is not a necessity but it is recommended to keep your CPU cool under load conditions by helping heat dissipate faster.

It is a must if you intend to over clock your PC.

Installing the motherboard Fig 3. 12. Open the side doors of the cabinet Lay the cabinet on its side Put the motherboard in place Drive in all the required screws Most motherboards come with an antistatic bag. It is advisable to put the motherboard on it for some time and then remove it from the antistatic bag before placing it in the cabinet. Fig 3.

13 Step 1 Installing the CPU CPU is the heart of a computer so make sure you handle it properly and do not drop it or mishandle it. Steps 1 * Lift the CPU lever on the motherboard Place the CPU properly on the motherboard * Pull

down the lever to secure the CPU in place Warning: Do not try to push the CPU into the motherboard! Step 2 Got the thermal compound? Now is the time to use it. Take small amount of it and carefully apply it on the top surface of the processor. Be careful not to put it on the neighboring parts of the motherboard. If you do so clean it immediately using the cloth.

Tip: Thermal compounds should be changed once every six months for optimal performance. Step 3 installing the heat sink Fig 3. 15 After installing the processor we proceed to installing the heat sink.

There are different kinds of heat sinks that are bundled with the processor and each has a different way of installation. Look into your CPU manual for instructions on how to install it properly.

Place the heat sink on the processor Put the jacks in place Secure the heat sink with the lever After this you will need to connect the cable of the heat sink on the motherboard. Again look into the motherboard manual on where to connect it and then connect it to the right port to get your heat sink in operational mode. Installing the RAM Fig 3. 16 Installing the RAM is also an easy job.

The newer RAMs that is DDR RAMs are easy to install as you don't have to worry about placing which side where into the slot. The older ones, SDRAMs are plagued by this problem.

Push down the RAM into the slot Make sure the both the clips hold the RAM properly Installing the power supply Fig 3. 17 Installing the power supply as the components we install after this will require power cables to be connected to them. There is not much to be done to install a PSU. Place the

PSU into the cabinet Put the screws in place tightly Tip: Some PSU have extra accessories that come bundled with it. Consult your PSU manual to see how to install them.

Step 6: Installing the video card Fig 3.

18 First you will need to find out whether your video card is AGP or PCI-E. AGP graphics cards have become redundant and are being phased out of the market quickly. So if you bought a spanking new card it will certainly be a PCI-E. * Remove the back plate on the cabinet corresponding to the graphics card * Push the card into the slot * Secure the card with a screw * Plug in the power connection from PSU (if required) High-end graphics cards need dedicated power supply and if your graphics card needs one then connect the appropriate wire from PSU into the graphics card.

Step 7: Installing the hard disk Fig 3.

19 Hard disk is another fragile component of the computer and needs to be handled carefully. Place the hard drive into the bay Secure the drive with screws If the jumpers or switches are set for the only hard drive or master role, move on. If the jumpers or switches are not configured correctly, move them to the correct position with your needle-nose pliers or your tweezers. Connect the power cable from PSU Connect the data cable from motherboard into the drive If your hard drive is a SATA one then connect one end of SATA cable into the motherboard and other into the SATA port on the hard disk.

If your hard disk is PATA type then use the IDE cable instead of the SATA cable.

Tip: If your PSU does not support SATA power supply then you will need to get a converter which will convert your standard IDE power connector to a SATA power connector. Fig 3. 20 Testing the Hard disk installation Verify that a monitor, keyboard, and mouse are connected to the PC. Make sure the power cord is connected and that the computer is receiving power. Power up the unit and watch the boot. Step 9: Connecting various cables Fig 3.

21 First we will finish setting up internal components and then get on to the external ones.

You will need to consult your motherboard manual for finding the appropriate port for connecting various cables at the right places on the motherboard. Connect the large ATX power connector to the power supply port on your motherboard. Next get hold of the smaller square power connector which supplies power to the processor and connect it to the appropriate port by taking help from your motherboard manual. Connect the cabinet cables for power, reset button in the appropriate port of the motherboard.

Connect the front USB/audio panel cable in the motherboard Plug the cable of cabinet fans

You are done with installing the internal components of the PC. Close the side doors of the cabinet and get it upright and place it on your computer table. Get the rest of the PC components like monitor, keyboard, mouse, speakers etc. which we will connect now. Connect the VGA cable of the monitor into the VGA port If mouse/keyboard is PS/2 then connect them to PS/2 ports or else use the USB port Connect the speaker cable in the audio

port Fig 3. 22 Plug in the power cable from PSU into the UPS Also plug in the power cable of the monitor You are now done with setting up your PC.

Power on and see your PC boot to glory. Step 10: Installing Operating System Here are some useful steps enter your BIOS settings instruct the computer to boot from the CD –ROM, insert a bootable disk fold your arms and watch your PC boot to Glory. CHAPTER FOUR 4. 1 NETWORKING AND NETWORK CABLES Knowledge gained on Networking Network is a group of connected computers. This can be as small and simple as two (2) computers connected together or as large and complex as a multisite network that supports thousands of computers and printers and other device.

Networking allows for increased communication (video conferencing, real-time chats, e-mailing etc), hardware and software resources sharing (printers, drives, data, files application etc) and Data back up and retrieval. Network models can be any of peer-to-peer or client/server model. Types of network include LAN (Local Area Network), WAN (Wide area network), MAN (Metropolitan Area Network), Virtual LAN, Virtual Private Network, (VPN). 4. 2 NETWORK DEVELOPMENT COMPONENTS Components used to develop a network can be classified broadly into 2 that is Hardware and software The Hardware components include * Computers Modems * Interfaces * Peripherals * Networking cards * Cabling – UTP, STP, Fiber Optics, coaxial * Interconnecting devices, e. g.

repeaters routers, hubs, NIC, switches, bridges The software includes operating system (such as MS Dos, UNIX, protocols and other software tools supporting the data communication across the network. The number of components (software and hardware) depends on a number of factors like,

type of Network to be used, number of workstation, hosts, PC terminals other peripheral devices to be connected to the Network, data volume, speed of transmission, application program and services required. . 3 MAIN TYPES OF NETWORK TOPOLOGIES In networking, the term " topology" refers to the layout of connected devices on a network. This article introduces the standard topologies of computer networking. One can think of a topology as a network's virtual shape or structure.

This shape does not necessarily correspond to the actual physical layout of the devices on the network. For example, the computers on a home LAN may be arranged in a circle in a family room, but it would be highly unlikely to find an actual ring topology there. Network topologies are categorized into the following basic types: * Star Topology Ring Topology * Bus Topology * Tree Topology * Mesh Topology * Hybrid Topology More complex networks can be built as hybrids of two or more of the above basic topologies. Star Topology: Many home networks use the star topology. A star network features a central connection point called a " hub" that may be a hub, switch or router. Devices typically connect to the hub with Unshielded Twisted Pair (UTP) Ethernet.

Compared to the bus topology, a star network generally requires more cable, but a failure in any star network cable will only take down one computer's network access and not the entire LAN. If the hub fails, however, the entire network also fails. ) See the illustration of Star Network Topology. Fig 4. 1 Advantages of a Star Topology * Easy to install and wire.

* No disruptions to the network then connecting or removing devices. * Easy to detect faults and to remove parts. Disadvantages of A Star Topology * Requires more cable length than a linear topology. * If the hub or concentrator fails, nodes attached are disabled. * More expensive than linear bus topologies because of the cost of the concentrators. The protocols used with star configurations are usually Ethernet or Local Talk.

Token Ring uses a similar topology, called the star-wired ring. Star-Wired Ring: A star-wired ring topology may appear (externally) to be the same as a star topology. Internally, the MAU of a star-wired ring contains wiring that allows information to pass from one device to another in a circle or ring. The Token Ring protocol uses a star-wired ring topology. Ring Topology: In a ring network, every device has exactly two neighbors for communication purposes. All messages travel through a ring in the same direction (either " clockwise" or " counterclockwise").

A failure in any cable or device breaks the loop and can take down the entire network. To implement a ring network, one typically uses FDDI, SONET, or Token Ring technology. Ring topologies are found in some office buildings or school campuses. See the illustration of Ring Topology. Fig 4. 2 Bus Topology: Bus networks (not to be confused with the system bus of a computer) use a common backbone to connect all devices.

A single cable, the backbone functions as a shared communication medium that devices attach or tap into with an interface connector.

A device wanting to communicate with another device on the network sends a broadcast message onto the wire that all other devices see, but only the

intended recipient actually accepts and processes the message. Ethernet bus topologies are relatively easy to install and don't require much cabling compared to the alternatives. 10Base-2 (" Thin Net") and 10Base-5 (" Thick Net") both were popular Ethernet cabling options many years ago for bus topologies. However, bus networks work best with a limited number of devices.

If more than a few dozen computers are added to a network bus, performance problems will likely result.

In addition, if the backbone cable fails, the entire network effectively becomes unusable. See the illustration of Bus Network Topology. Fig 4. 3 Advantages of a Linear Bus Topology * Easy to connect a computer or peripheral to a linear bus. * Requires less cable length than a star topology.

Disadvantages of a Linear Bus Topology * Entire network shuts down if there is a break in the main cable. * Terminators are required at both ends of the backbone cable. * Difficult to identify the problem if the entire network shuts down. * Not meant to be used as a stand-alone solution in a large building.

Tree Topology: Tree topologies integrate multiple star topologies together onto a bus. In its simplest form, only hub devices connect directly to the tree bus and each hub functions as the " root" of a tree of devices.

This bus/star hybrid approach supports future expandability of the network much better than a bus (limited in the number of devices due to the broadcast traffic it generates) or a star (limited by the number of hub connection points) alone. See the illustration of Tree Network Topology. Fig

4. 4 Advantages of a Tree Topology Point-to-point wiring for individual segments.

Supported by several hardware and software vendors.

Disadvantages of a Tree Topology Overall length of each segment is limited by the type of cabling used. If the backbone line breaks, the entire segment goes down. More difficult to configure and wire than other topologies. Mesh Topology: Mesh topologies involve the concept of routes. Unlike each of the previous topologies, messages sent on a mesh network can take any of several possible paths from source to destination.

(Recall that even in a ring, although two cable paths exist, messages can only travel in one direction. Some WANs, most notably the Internet, employ mesh routing. A mesh network in which every device connects to every other is called a full mesh. As shown in the illustration below, partial mesh networks also exist in which some devices connect only indirectly to others. See the illustration of Mesh Network Topology. Fig 4.

5 Hybrid Topology A combination of any two or more network topologies. Note 1: Instances can occur where two basic network topologies, when connected together, can still retain the basic network character, and therefore not be a hybrid network.

For example, a tree network connected to a tree network is still a tree network. Therefore, a hybrid network accrues only when two basic networks are connected and the resulting network topology fails to meet one of the basic topology definitions. For example, two star networks connected

together exhibit hybrid network topologies. Note 2: A hybrid topology always accrues when two different basic network topologies are connected.

4. 4 Network Adapters There are many different names for network adapters, including network cards, Network Interface Cards, NICs. These are all generic terms for the same piece of hardware.

A network card's job is to physically attach a computer to a network, so that the computer can participate in network communications. The first thing that you need to know about network cards is that the network card has to match the network medium. The network medium refers to the type of cabling that is being used on the network.

Wireless networks are a science all their own, and I will talk about them in a separate article. At one time making sure that a network card matched the network medium was a really big deal, because there were a large number of competing standards in existence.

For example, before you built a network and started buying network cards and cabling, you had to decide if you were going to use Ethernet, coaxal Ethernet, Token Ring, Arcnet, or one of the other networking standards of the time. Each networking technology had its strengths and weaknesses, and it was important to figure out which one was the most appropriate for your organization. Today, most of the networking technologies that I mentioned above are quickly becoming extinct.

Pretty much the only type of wired network used by small and medium sized businesses is Ethernet. This is what an Ethernet card looks like

Fig 4. 6 4. 5 UTP CABLE TYPES UTP cabling, terminated with RJ-45 connectors, is a common copper-based medium for interconnecting network devices, such as computers, with intermediate devices, such as routers and network switches. Different situations may require UTP cables to be wired according to different wiring conventions. This means that the individual wires in the cable have to be connected in different orders to different sets of pins in the RJ-45 connectors.

The following are main cable types that are obtained by using specific wiring conventions: * Ethernet Straight-through Ethernet Crossover * Rollover Using a crossover or straight-through cable incorrectly between devices may not damage the devices, but connectivity and communication between the devices will not take place. This is a common error in the lab and checking that the device connections are correct should be the first troubleshooting action if connectivity is not achieved. Unshielded twisted-pair (UTP) cabling, as it is used in Ethernet LANs, consists of four pairs of color-coded wires that have been twisted together and then encased in a flexible plastic sheath.

The twisting has the effect of canceling unwanted signals. When two wires in an electrical circuit are placed close together, external electromagnetic fields create the same interference in each wire.

The pairs are twisted to keep the wires in as close proximity as is physically possible. When this common interference is present on the wires in a twisted pair, the receiver processes it in equal yet opposite ways. As a result, the signals caused by electromagnetic interference from external sources are effectively cancelled. 4. 6UTP CABLING STANDARDS

The UTP cabling commonly found in workplaces, schools, and homes conforms to the standards established jointly by the Telecommunications Industry Association (TIA) and the Electronics Industries Alliance (EIA). TIA/EIA-568A stipulates the commercial cabling standards for LAN installations and is the standard most commonly used in LAN cabling environments.

Some of the elements defined are: * Cable types * Cable lengths * Connectors * Cable termination * Methods of testing cable There three (3) types of unshielded twisted pair Ethernet cables and they are: Ethernet Straight- through

Ethernet Crossover Rollover The figure below shows the color combinations for producing these cables Fig 4. 7 CABLE TYPE| STANDARD| APPLICATION| Ethernet straight- through| Both end T568A or both end T568B| Connecting a network host to a network device such as a switch or hub. Connect a computer to a cable/DSL modem's LAN portConnect a router's WAN port to a cable/DSL modem's LAN port. Connect a router's LAN port to a switch/hub's uplink port. (normally used for expanding network)Connect two (2) switches/hubs with one of the switch/hub using an uplink port and the other one using normal port.

Ethernet crossover| One end T568A, And the other end T568B. | Connecting two network hosts. Connecting network intermediary devices such as (switch- to- router) or (router-to-router)Connect 2 switches/hubs by using normal port in both switches/hubs. | Rollover| Ciscoproprietary| Connect a workstation serial port to a router console port, using an adapter. | Making Ethernet UTP cables WHAT YOU NEED Fig 4.

8 Cable- Be sure the cable(s) you are using is properly rated for CAT 5. It should state clearly on the jacket of the cable, what it is rated at.

One option that you have when selecting your cable is to use a pre-made normal ' straight through' cable, and simply whack off one of the ends, and replace with a new " Crossed Over" end. For the purpose of this report, though, we aren't going to go that route. We are going to make the whole thing from scratch – using bulk CAT 5 cable. Connectors – Crossover cables are terminated with CAT 5 RJ-45 (RJ stands for " Registered Jack") modular plugs.

RJ-45 plugs are similar to those you'll see on the end of your telephone cable except they have eight versus four contacts on the end of the plug.

Also, make sure the ends you select are rated for CAT 5 wiring. There are also different types of jacks which are used for different types of cabling (such as Solid Core wire). Make sure you buy the correct jacks for your cabling. Crimper – You will need a modular crimping tool.

Fig 4. 9 Stripper – There are several specialized tools, which can be used to strip the jackets off of cabling. If you do not have access to one of these tools, cautious use of a razor blade or knife should work just fine – but keep in mind if you go the razor blade / knife route, extra special care must be used as to not damage the wires inside the jacket.

Cutters – You need a pair of cutters that will allow you to cut a group of cables in a straight line. It is very important that all the wires are the same lengths, and without proper cutters, this can be a difficult task.

Fig 4. 10 LAN Tester – You need the LAN tester to test the cable after crimping to ensure the functionality of the cable. Connect the cable to the tester and see if all lights turn green. If all lights turn green, your cable is working properly. If they do not, cut the RJ-45 connector off and re-terminate the ends of the cable with a new one.

Fig 4.

11 1. Start by stripping off about 2 inches of the plastic jacket off the end of the cable. Be very careful at this point, as to not nick or cut into the wires, which are inside. Doing so could alter the characteristics of your cable, or even worse render it useless. Check the wires, one more time for nicks or cuts. If there are any, just whack the whole end off, and start over. Fig 4. 12 2)Spread the wires apart, but be sure to hold onto the base of the jacket with your other hand. You do not want the wires to become untwisted down inside the jacket.

Category 5 cable must only have 1/2 of an inch of ' untwisted' wire at the end; otherwise it will be ' out of specification' Fig4. 13 Up to this point, things have been pretty easy. Things will get a little bit tricky here, but don't worry; we'll get through this together. We are at a point in this report where a decision needs to be made. You need to decide which end of the cable you are making at this point in time. If you are making your cable from scratch like I am doing while writing this report, you have 2 end jacks, which must be installed on your cable.

If you are using a pre-made cable, with one of the ends whacked off, you only have one end to install – the crossed over end. Below are two diagrams,

which show how you need to arrange the cables for each type of cable end. Decide at this point which end you are making and examine the associated picture below. Fig4. 14 Begin to untwist the twisted exposed wires on your cable. Use caution so that you do not untwist them down inside the jacket. Once you have all the wires untwisted begin to arrange them in the proper order based on the pictures above.

This stage can be a frustrating one, especially some of the middle wires. Once you get all the wired arranged in the proper order, make sure your wire cutters are within reach then grasp them right at the point where they enter the jacket. Make sure you keep them in the proper order! Grab your cutters now. Line them up along your prepared wires about 1/2 inches above the jacket. Be sure at this point that you are both 1/2 inches above the jacket, and that your cutters are aligned straight across the wires. You want to make a clean cut here – also make sure you don't let go of that jacket / wires!

Fig4. 15 5. Grab those crimpers – because not all crimpers are exactly the same your pictures may not match exactly what you see below. Be sure to keep a good grip on that jack and the cable. Insert the jack into the crimper. It should only go in one way, so you don't have a whole lot to worry about inserting it. Begin to compress those crimpers. You will more than likely hear a clicking sound. Keep squeezing. If you try to let go too early, nothing will happen. They will not release. Keep going until they stop clicking / stop moving all together.

At this point, you should be able to let go of the jack, and the crimpers. The crimpers should release now leaving you with a crimped jack. If the crimpers do not release, you probably didn't press hard enough. Fig4. 16 6)It's time to

examine what we have done. If you look at the end of the jack you should see that the copper connectors should not be pressed down into the wires. Toward the back of the jack (where the jacket meets the jack) it should be crimped securely holding the jacket / cable in the jack. If something has gone wrong, don't worry, it's not the end of the world.

Grab those cutters, and just whack the whole jack off and start back at step 1 (a frustrating one I know, but it's better to have a cable that works, than to spend hours trouble shooting your PC trying to figure out why you can't see the other machine). If everything is cool, all you have to do now is make the other end of the cable so go back to step one, and make the other end as I have explained in this report. Fig 4. 17 Good | | | Fig4. 18| | WRONG WAY – Note how the blue plastic shielding is not inside the connector where it can be locked into place. | | | | Fig4. 9| | WRONG WAY – Note how the cables do not go all the way to the end of the connector. | 4. 7 CONNECTING TWO COMPUTERS USING CROSSOVER CABLES Fig 4. 20 Plug in network card each to computer and then install network card driver for each computer. Connect the cable to both computers' network card. Here comes the network configuration, let's create a simple network by assigning following network info to each computer's network card: Computer A: IP Address: 10. 1. 1. 1 Subnet mask: 255. 255. 255. 0 Gateway: DNS Servers: Computer B: IP Address: 10. 1. 1. 2 Subnet mask: 255. 255. 255. 0 Gateway: DNS Servers:

Since these 2 computers are directly connected, no gateway and DNS servers are needed. After assigning IP address, try to ping the other computer from command prompt, you should be able to ping each other and then sharing printers or files as you wish. 4. 8 USING PING TO

TROUBLESHOOT NETWORK PROBLEM Sometimes if your network connection is down, you can use ping to troubleshoot network problem and then fix it. Ping is a program used to check whether a host is up and active in network. It's very simple and usually used to troubleshoot network problem. Here is typical technique for pinging and it applies to wireless network as well. . First thing you need to do is to make sure there is light on network card with cable connected. Sometimes network down is due to disconnected network cable or loose cable connection. If you notice no light on your network card after connecting with network cable, make sure the network cable is working. If you see the light, then proceed to step 2. 2. Go to Start and click on Run. Type CMD, and hit Enter or click OK. Fig 4. 21 Type " ping" in the Command Window. Hit the space bar once. Type the IP or website address that you want to ping. For example, if you want to pingEbay, type " www. ebay. om" after the space. Hit " Enter. " If the website is up and actively responding, you receive replies back from the server that you pinged with the following information: The IP address The number of Bytes sent The time it took in milliseconds The TTL is Time to Live (This indicated the number of " hops" back from the computer pinged from that computers initial TTL value. ) Fig4. 22 4. 9HUBS AND SWITCHES As you can see, computers use network cards to send and receive data. The data is transmitted over Ethernet cables. However, you normally can't just run an Ethernet cable between two PCs and call it a network.

In this day and age of high speed Internet access being almost universally available, you tend to hear the term broadband thrown around a lot. Broadband is a type of network in which data is sent and received across the

same wire. In contrast, Ethernet uses Baseband communications. Baseband uses separate wires for sending and receiving data. What this means is that if one PC is sending data across a particular wire within the Ethernet cable, then the PC that is receiving the data needs to have the wire redirected to its receiving port. You can actually network two PCs together in this way.

You can create what is known as a cross over cable. A cross over cable is simply a network cable that has the sending and receiving wires reversed at one end, so that two PCs can be linked directly together. The problem with using a cross over cable to build a network is that the network will be limited to using no more and no less than two PCs. Rather than using a cross over cable, most networks use normal Ethernet cables that do not have the sending and receiving wires reversed at one end. Of course the sending and receiving wires have to be reversed at some point in order for ommunications to succeed. This is the job of a hub or a switch. Hubs are starting to become extinct, but I want to talk about them anyway because it will make it easier to explain switches later on. There are different types of hubs, but generally speaking a hub is nothing more than a box with a bunch of RJ-45 ports. Each computer on a network would be connected to a hub via an Ethernet cable. You can see a picture of a hub, shown in Figure C. Fig 4. 23 A hub is a device that acts as a central connection point for computers on a network A hub has two different jobs.

Its first job is to provide a central point of connection for all of the computers on the network. Every computer plugs into the hub (multiple hubs can be daisy chained together if necessary in order to accommodate more computers). The hub's other job is to arrange the ports in such a way so that

if a PC transmits data, the data is sent over the other computer's receive wires. Right now you might be wondering how data gets to the correct destination if more than two PCs are connected to a hub. The secret lies in the network card. Each Ethernet card is programmed at the factory with a unique Media Access Control (MAC) address.

When a computer on an Ethernet network transmits data across an Ethernet network containing PCs connected to a hub, the data is actually sent to every computer on the network. As each computer receives the data, it compares the destination address to its own MAC address. If the addresses match then the computer knows that it is the intended recipient, otherwise it ignores the data. As you can see, when computers are connected via a hub, every packet gets sent to every computer on the network. The problem is that any computer can send a transmission at any given time.

Have you ever been on a conference call and accidentally started to talk at the same time as someone else? This is the same thing that happens on this type of network. When a PC needs to transmit data, it checks to make sure that no other computers are sending data at the moment. If the line is clear, it transmits the necessary data. If another computer tries to communicate at the same time though, then the packets of data that are traveling across the wire collide and are destroyed (this is why this type of network is sometimes referred to as a collision domain). Both PCs then have to wait for a random mount of time and attempt to retransmit the packet that was destroyed. As the number of PCs on a collision domain increases, so does the number of collisions. As the number of collisions increase, network efficiency is decreased. This is why switches have almost completely replaced hubs. A

switch, such as the one shown in Figure D, performs all of the same basic tasks as a hub. The difference is that when a PC on the network needs to communicate with another PC, the switch uses a set of internal logic circuits to establish a dedicated, logical path between the two PCs.

What this means is that the two PCs are free to communicate with each other, without having to worry about collisions. Fig4. 24 A switch looks a lot like a hub, but performs very differently Switches greatly improve a network's efficiency. Yes, they eliminate collisions, but there is more to it than that. Because of the way that switches work, they can establish parallel communications paths. For example, just because computer A is communicating with computer B, there is no reason why computer C can't simultaneously communicate with computer D.

In a collision domain, these types of parallel communications would be impossible because they would result in collisions. 4. 10 PLANNING AND CABLING NETWORKS. When planning the installation of LAN cabling, there are four physical areas to consider: Work area Telecommunications room, also known as the distribution facility Backbone cabling, also known as vertical cabling Distribution cabling, also known as horizontal cabling Total Cable Length For UTP installations, the ANSI/TIA/EIA-568-B standard specifies that the total combined length of cable spanning the four areas listed above is limited to a maximum distance of 100 meters per