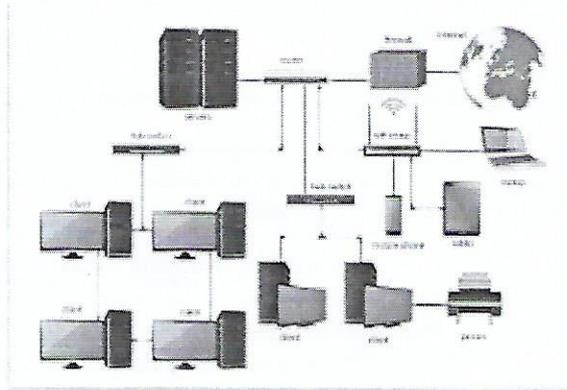


### Purpose of an ICT infrastructure

An ICT infrastructure is an effective platform for;

- Quick distribution of Information Services or Business applications
- Maintaining and managing company or organizational data and information
- Sharing of resources and data
- Communication and collaboration for companies or organisations



## 2. Data Communication Networks

Types of data communication networks

Companies and organisations depend on data communication networks to transmit information; each uses a system of symbols, writing, signals, or speech to share information, communicating via tools such as phones and computers.

Here are some of the different types of data networks;

### Local Area Network (LAN)

A local area network is a network of computers in a localized area, such as in an office or on a campus. All the computers are connected to each other through the LAN using cables or wireless with network devices such as a hub or a switch.

### Wide-Area Network (WAN)

A wide-area network covers a large geographic area and consists of multiple computer networks. The Internet is an example of a WAN that relies on a large global network of service providers that use devices such as routers, switches, modems, and servers to provide connectivity to users and organisations around the globe.

### Metropolitan Area Network (MAN)

A MAN is a network that uses technology designed to extend over an entire city. For example, a company could use a MAN to connect the LANs in all its offices throughout a city.

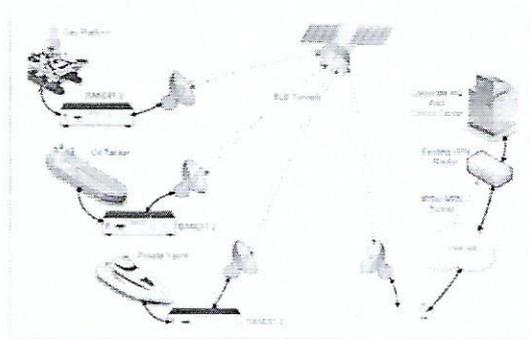


### Wireless Networks

Wireless networks provide transmission and network connectivity to devices without cables or wires. Wi-Fi is a wireless network for computers that have remote access to the network.

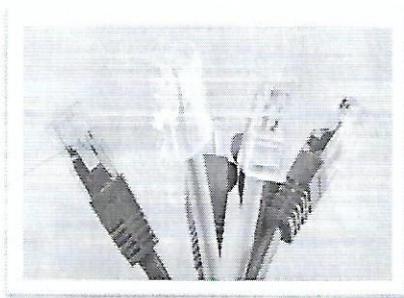
### Satellite Networks

Satellite networks are offered in a number of configurations. Telephone operating companies use satellites for data and voice transmission to mobile phones on the ground. Some satellite networks provide navigation information, military surveillance, or weather data. Still others provide television programming, radio broadcasts, and even broadband Internet service.



### Cable Technology

Cables are the backbone of every data networking system: If a cable goes down, the entire system can fail.



The most common type of data networking cable is **Ethernet Cable or Twisted Pair Cable**.

Consists of two insulated strands of copper wire twisted around each other. There are two types of twisted-pair cable: unshielded twisted-pair (UTP) and shielded twisted-pair (STP) cable.

A number of twisted-pair wires are grouped together and enclosed in a protective cover to form a cable. The total number of pairs in a cable varies. The twisting cancels out electrical noise from adjacent pairs and from other sources such

as motors and transformers.

Ethernet cables are used to set up local area networks. In most cases, they're used to connect computers to switches or routers.

Ethernet cables come in three (3) different categories:

- Cat 5 cables are the most basic type and provide speeds of either 10 Mbps or 100 Mbps (Megabits per second).
- Cat 5e, which means Cat 5 Enhanced, allows for faster data transmission than its predecessor. It caps at 1,000 Mbps.
- Cat 6 is the latest and offers the best performance of the three. It's capable of supporting 10 Gbps (Gigabits per second) speeds.

### **Wireless Technology**

When you connect a laptop to a WiFi hotspot at a cafe, hotel, airport lounge, or other public place, you're connecting to that business's wireless network.

Wireless technologies are widely used in both home and business computer networks.

A large number of technologies have been developed to support wireless networking in different usages. Common wireless technologies include:

- Wi-Fi, especially popular in home networks and as a wireless hotspot technology
- Bluetooth, for low power and embedded applications
- 3G and 4G cellular Internet

Wireless technologies employ radio waves and/or microwaves to maintain communication channels between computers. A wireless local-area network (LAN) uses radio waves to connect devices such as laptops to the Internet and to your business network and its applications.

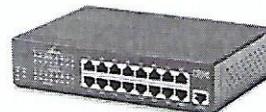
Popular WLAN technologies all follow one of the three main Wi-Fi communication standards.

- *802.11b was the first standard to be widely used in WLANs.*
- *The 802.11a standard is faster but more expensive than 802.11b; 802.11a is more commonly found in business networks.*
- *The newest standard, 802.11g, attempts to combine the best of both 802.11a and 802.11b, though it too is more a more expensive home networking option.*

### **Common data networking devices**

There are lots of specialised networking devices in the world today. These are hardware devices used to connect computer systems to the network. Here are five (5) commonly used network devices today;

- Hub
- Switch



- Router
- Firewall
- Wireless Access Point

These 5 devices: the hub, switch, router, firewall, and wireless Access Point will comprise the vast majority of the network devices that are used today.

#### Key features of a data network switch

- A switch is replacing the use of hubs.
- It is a device that is most likely on the other side of the cable your computer is plugged into.
- A switch only repeats network traffic out to ports it needs to rather than out all of its ports.
- Switches have several network ports, sometimes dozens, to connect many devices to the LAN.



#### Key features of a Network Interface Card (NIC).

- A network interface card (NIC) is a circuit board or card that is installed in a computer so that it can be connected to a network.
- The card provides the computer with a dedicated, full-time connection to a network.
- Personal computers and workstations on a local area network (LAN) contain a network interface card specifically designed for the LAN transmission technology.

#### Key features of a Data network router

- A router works like a modem connecting networks and enabling the flow of data between them.
- Without routers there would be no Internet.
- You could connect a few computers together in a building, but without a router you will not be able to connect to the Internet.



#### Key features of a wireless access point.

- Access points are the basic elements of a wireless network. They scan for the wireless devices in its range and all the neighbouring Wi-Fi systems connect to the Access Point to communicate with the network.
- Access points offer a standard for connectivity (wireless standard are a, b/g, b/g/n) which are used by Wi-Fi systems or devices to connect to the network.
- Access points connect to PC's, laptops, mobiles, Wi-Fi phones, Wi-Fi Cameras, Wi-Fi display management systems and a host of other devices that work on the Wi-Fi standard.
- Access points can also scan the network for wireless threats and attacks.



### 3. Software Installation

#### Basic software requirement of a local organisation.

Software requirements depend mostly on what the organisation does. Software are designed and developed for different purposes. Different types of software are available over the Internet and can be downloaded and installed by users easily. Users can choose open source or proprietary software based on what the organisation wants.

#### Types of Software

Type of Software	Name of known software	Distribution Type	Purpose	Type of Organisation
System Software	MS Windows	Proprietary	To operate a PC	

	Linux	Open Source		Any type of organisation
	Mac OS X	Proprietary		
Productivity Software	MS Office	Proprietary	To develop documents, spreadsheets, databases, presentations	Any type of organisation
	Open Office	Open Source		
Digital Design Software	Photoshop	Proprietary	To design graphics and publishing tasks	Schools, news media, media designs, advertise companies, movie makers
	MS publisher	Proprietary		
	GIMP	Open source	To edit video	
	Movie maker	Proprietary		
	Open movie editor	Open source		
Web design	Drupal	Open source	To develop web sites	Anyone
	Joomla	Open source		
	Dreamweaver	Proprietary		
Web browsers	Firefox	Open Source	To access the world wide web	Anyone
	Chrome	Open Source		
	Internet Explorer	Proprietary		
	Safari	Proprietary		
Enterprise resource planning (ERP)	Fedena School Management information System	Open Source	To manage school operation	Schools
	Odoo	Open Source	To manage business operation and transactions	Businesses
Database management Systems	MS Access	Proprietary	To develop databases	Schools, Businesses, Government agencies
	Oracle	Proprietary		
	My SQL	Open Source		
Antivirus	McAfee Antivirus	Proprietary	To protect and remove viruses	Anyone
	Norton Antivirus	Proprietary		
	Clam AntiVirus	Open Source		

### Open Source Software VS Proprietary software.

Open Source		Proprietary	
Definition	Characteristics	Definition	Characteristics
A software that the source code is available for free. The source code can be duplicated and modified by advance users to make it work better.	Purchased with its source code	A software that was developed and owned by a company. No one may duplicate or distribute the software without the owner's permission	Purchased without its source code
	The source code is free of charge		Users must pay for the software to use
	Most open source software are free to use		Users may need a license for the software to be installed
	Software can be downloaded from the Internet and install for free Support is mostly from groups of software developers		Full support from vendor if there is problems with the software

### Downloading and Installing Software

Many software are now available on the Internet for users to download and install on their computers. With the growing use of smart phones and tablet PCs; more and more apps or applications are readily available online for free.

Some software are free to download but may require a purchased license for installation. So, users must follow the proper downloading instructions in order to understand the requirements for each software.

Some software when users download over the Internet could contain harmful code that could do all kinds of damage to your computer or mobile device. It could mess up other software, take control of your computer, or compromise your personal data and expose you to possible identity theft.

Downloading free software (freeware) from the Internet can be risky; some free applications also have spyware or adware or other malicious code such as viruses, worms or so-called Trojan horses embedded inside. So sometimes when you download some freeware onto your computer via the Internet, malware can also sneak onto your computer and damage your important files.

Another risk of freeware is that your computer could be attacked by malicious programs (known as botnets) that take control of your computer so thieves can steal your identity.

Before downloading and installing software over the Internet, follow the following guidelines;

- Google the name of the application and read about the application to ensure that you know the application is a known application and it's not malicious software.
- Users can also read application reviews from commercial sites that test the software, such as CNET or ZDNet.
- Only download from well-known vendors that participate in verification programs that confirm software is legitimate. Look for a seal of approval for example, TRUSTe is one such organization that provides vendors with a seal of approval logo after a due diligence process has been completed.
- Keep security programs up-to-date such as anti-virus and anti-spyware software running on your computer before you download anything.
- Must download and install all security patches. A lot of this malicious software exploits older versions of software. If there is a bug in the software, it's important to keep it updated.
- Be careful of social network freeware. A growing number of social networks, such as MySpace and Facebook, also offer free applications you can use while on those sites or by downloading them to your computer.

Note: Always take necessary steps by protecting yourself by having the tools on your computer in case you do mistakably download and install applications that are suspicious.