Fact sheet

Internet Service Options

This fact sheet has been developed for the Consumer Education Program by the Communications Commission of Kenya. It was compiled by studying material from various authoritative sources and adopting what is universally acceptable and relevant to the Kenyan situation. The fact sheet is intended to enable Consumers have a good understanding of the issues discussed and hence empower them when making decisions regarding ICT products and systems.

Introduction

The internet is a worldwide, publicly accessible series of globally interconnected computer networks that allows users access resources and information within the network. It is a loose confederation of autonomous databases and networks, originally developed for academic use, but now a global structure of millions of sites accessible by anyone. The services offered through the internet include Web browsing through World Wide Web - www, File download using ftp, Remote login, voice calls, online games, music and videos.

The internet has developed very rapidly and offers many services implemented through various technologies, which have many associated terminologies. It has become difficult for the Consumers to keep abreast with all these technologies and therefore unable to make effective decisions when procuring services. This fact sheet has been developed to help Consumers understand some of the commonly available internet services and associated terminologies, and also addresses the speeds at which information can be delivered under the different services.

Internet Services

Web hosting

Web hosting service is a type of Internet hosting service that allows individuals and organizations to provide their own websites accessible via the World Wide Web. The scopes of hosting services vary widely. The most basic is webpage and small-scale file hosting, where files can be uploaded via File Transfer Protocol (FTP) or a Web interface. The files are usually delivered to the Web "as is" or with little processing. Many Internet service providers (ISPs) offer the uploading of data for free to their subscribers while some providers charge a fee. Web hosting companies often quote a monthly bandwidth limit for a website, for example 5 gigabytes per month. If the total amount of data downloaded from the website in a particular month reaches this limit, the hosting company may shut off further public access to the site.

Dial up Internet Services

This is an internet access service that enables one to access the internet using the normal telephone line and a modem. This service is very useful to people who travel a lot and want a service that is easily available, cost effective so as to access the internet to transmit light data. Once the Consumer is using the service, the telephone line is not available to receive or to make calls. Once connected you can utilise all aspects of the internet. The dial-up connection speed for a standard 56k modem can *theoretically* transfer 56 **Kilobits** of data a second.

When you consider the average web page including images is around 50 **Kilobytes**, this means it would take around 7 seconds for the web page to completely load in your browser.

On top of this most (though not all) internet service providers charge by the minute for your connection, so the longer it takes to load the pages you visit, the more you pay for your connection.

Advantages of Dial-up connection

Dial-up connections can be very economic and are widely available. These connections use a standard modem and therefore the hardware costs are minimal.

Disadvantages of Dial-up connection

Dial-up connections are very slow compared to other connection types. When connected to the internet the same phone line cannot be used for phone calls, so if anyone phones you when you are connected they will get the busy signal.

Dial-up connections transfer data over an analogue line. Before the data is sent it has to be converted from digital to analogue, likewise when data is received it has to be converted from analogue to digital (this is what the modem does), this adds a performance overhead which affects the speed of the connection.

Cable Internet Services

Cable television service companies provide Internet service, using their cables to deliver a fast, continuous connection. Connection speeds range from 500 Kbps up to more than 1 Mbps. The downloading speed is often faster than the speed for sending data. There is normally a monthly subscription fee and a fixed amount for the cable modem although, local providers frequently offer promotions with reduced prices for cable modems. This service may be cheaper if you subscribe to cable TV at the same time. Because a cable connection uses a totally separate medium to transfer data.

Internet Services Options

Advantages of Cable connections

Cable internet connection can provide very high speeds for downloading large files such as music or large attachments. Cable connections transfer data digitally, eliminating any digital/analogue conversion overhead. Cable connections are *always on*, eliminating long waits to make a connection.

Disadvantages of Cable connections

Cable connections are not available in every neighbourhood. Because cable connections are '***Always on,'*** one needs a firewall and activation of other security features so as to protect the computer.

ISDN services

The ISDN digital access service is a service that is made available through existing telephone lines. This service provides the user with the possibility of initializing end to end digital connection that can support a variety of services including value added features. ISDN services include:

- **Web browsing**

With ISDN one can surf the internet at speeds four times faster than when accessing using an analogue modem

- **Faxing at high speed**

With ISDN, one can exchange on plain paper high quality documents with other fax machines anywhere in the world in as less than 10 seconds thus saving on call charges.

- **Interconnecting a local area network**

ISDN can be used to interconnect LANs located at different places thus creating a fast wide area network.

- **Desktop video-conferencing**

Using an ISDN line and a desktop video conferencing system, one can be able to hold an on-screen conference without having to travel to converge the participants in one place as long as they are connected to an ISDN service.

ADSL services

ADSL service is an internet access service that uses a typical telephone line and a modem. The ADSL connection works by splitting the phone line into two separate channels, one for data (internet) and the other for voice (phone calls). With this service one can talk on the phone and still be connected to the internet at the same time. The following are services that one can get using ADSL connections**:**

High speed internet access; allowing one to browse the internet at high speeds

e-Commerce; providing the bandwidth necessary to allow business to conduct instant transactions and to better customize their websites with richer multimedia content

Security surveillance; it can be used to provide cost effective solutions for monitoring remote locations streamed through the internet on closed circuit television (CCTV)

Remote LAN access network for remote LAN and internet access.

Services are available in Kenya in the following bandwidth ranges (Notice there are two values to each configuration, the first figure states the upload speed and the second figure is the maximum download speed.)

- 32/128 kbps
- 64/256 kbps
- 128/1MB
- 512/2MB

Advantages of ADSL connection

Apart from the obvious speed advantages that ADSL connections offer, ADSL technology eliminates the need for a second phone line by allowing voice and data transfer at the same time (you can use the phone as normal while connected to the internet).

ADSL allows for digital data transfer and thus does not need to convert the data from digital to analogue and back again.

ADSL connections are ***always on***, saving on connection time.

Disadvantages of ADSL connection

ADSL connections are not available to everyone; ADSL services are only available to person connected to the standard telephone line. You should always ensure that you have ADSL coverage in your area (an ISP will check this for you). The hardware costs can be quite significant as you will need a special ADSL modem and ADSL filters to use the service. Most ISPs allow you to hire these items which can reduce the initial cost.

Because ADSL connections are always on you will need a firewall to protect your Computer

Wireless Internet Services

iBurst

iBurst is a mobile broadband wireless access system and can provide high performance, high speed, secure, mobile wireless access for business, home and office applications. iBurst offers the following benefits:

- Up to 1 Mbps data connectivity
- Wide area wireless access means that larger cell sizes can be accommodated.
- Always on connectivity
- The service is fully compatible with existing laptops, PDAs and desktop computers - no upgrades or new devices required.
- Many characteristics of the iBurst service combine to make it more secure than existing wireless delivery modes including the directionality of the signal as well as extensive encryption of the data transferred.

Wi-Fi

This is a wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections. Wi-Fi works with no physical wired connection between sender and receiver by using radio frequency (RF), a frequency within the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. The basis of any WiFi wireless network is the access point (AP). The primary job of an access point is to broadcast a wireless signal that computers can detect and "tune" into. In order to connect to an access point and join a wireless network, computers and devices must be equipped with wireless network adapters. Wi-Fi has been deployed in airports, universities, bookstores, coffee shops, office campuses and private residences.

WiMAX

WiMAX can be used for wireless networking in much the same way as WiFi. It is a second-generation protocol that allows for more efficient bandwidth use, interference avoidance, and is intended to allow higher data rates over longer distances.

The bandwidth and reach of WiMAX make it suitable for the following potential applications:

- Connecting Wi-Fi hotspots with each other and to other parts of the Internet.
- Providing a wireless alternative to cable and Digital Subscriber line (DSL) for last mile (last km) broadband access.
- Providing high-speed mobile data and telecommunications services.
- Providing a diverse source of Internet connectivity as part of a business continuity plan. That is, if a business has a fixed and a wireless internet connection,

especially from unrelated providers, they are unlikely to be affected by the same service outage.

Mobile Internet services

GPRS

GPRS (General Packet Radio Service) is rapidly becoming a global standard for sending and receiving high-speed data across the GSM network. Under GPRS one is billed by the amount of data sent and received, in contrast to rather than conventional Circuit Switched Data services which are billed by the connection time.

The advantages of GPRS technology is that it allows users to stay connected to the Internet under fast download speeds as no time is spent attempting to access a dial-up connection. It allows one to stay permanently connected to the mobile Internet without running up a huge phone bill. This is because with GPRS, you are only charged for the amount of information you send and receive, not the length of time you use your phone. This means that once one switches on their GPRS phone and connect to the mobile Internet, you can stay on all day. Similarly when one receives a call while browsing with the GPRS service, you can simply pause your browsing session, take the call, and then carry on reading the page you were on already.

EDGE

EDGE (Enhanced Data Rates for GSM Evolution) technology represents a step between GPRS and 3G mobile systems.

EDGE allows the delivery of advanced mobile services such as the downloading of video and music clips, full multimedia messaging, high-speed colour Internet access and e-mail. However the speed depends upon the signal quality, number of users as well as the type of mobile phone in use. EDGE offers the following benefits:

- faster Internet access and browsing,
- faster MMS,
- faster email transfer,
- audio contents transfer,
- video contents transfer,
- games,
- as well as all other application with the same price of data transmission as with the ’classic’ GPRS.

3G

3G or Third-Generation Mobile networks are an ITU specification for the third generation of mobile communications technology. It refers to broadband digital wireless mobile telephone networks that offer increased voice capacity and provide higher data

rates than 2G networks. 3G can support the new range of digital services available for mobile devices, such as internet access, multimedia applications, and support for global roaming. 3G is capable of a bandwidth of up to 384 Kbps when a device is stationary or moving at pedestrian speed, 128 Kbps in a car, and 2 Mbps in fixed applications. 3G will work over wireless air interfaces such as GSM, TDMA, and CDMA.

CDMA

Short for **Co**de-**D**ivision **M**ultiple **A**ccess, a digital cellular technology that uses spread-spectrum techniques where a signal is spread across multiple radio frequencies resulting in a signal with a wider bandwidth increasing its resistance to interference. Unlike competing systems, such as GSM, that use TDMA, CDMA does not assign a specific frequency to each user. Instead, every channel uses the full available spectrum. Individual conversations are encoded with a special coding scheme (where each transmitter is assigned a code) to allow many users to share a communication medium for data and telephone communication. CDMA consistently provides better capacity for voice and data communications than other commercial mobile technologies, allowing more subscribers to connect at any given time, and it is the common platform on which 3G technologies are built.

HSDPA

HSDPA, short for High-Speed Downlink Packet Access, is a new protocol for mobile telephone data transmission. It is known as a 3.5G (G stands for generation) technology. Essentially, the standard provides download speeds on a mobile phone equivalent to an ADSL (Asymmetric Digital Subscriber Line) line in a home, removing any limitations placed on the use of your phone by a slow connection. It is an evolution and improvement on W-CDMA, or Wideband Code Division Multiple Access, a 3G protocol. HSDPA improves the data transfer rate by a factor of at least five over W-CDMA. HSDPA can achieve theoretical data transmission speeds of 8-10 Mbps (megabits per second). Though any data can be transmitted, applications with high data demands such as video and streaming music are the focus of HSDPA.

VSAT Services

Service applications available under VSAT include:

- Electronic mail
- WAN/LAN networking
- Broadband internet/intranet access
- Automatic teller machine interconnection
- Electronic point of sale terminal interconnection
- Credit card verification
- Multimedia service delivery
- Distance learning and training

How to measure the speed of an internet or data connection

The type of connection you use has a direct effect on the speed with which you will be able to use the Internet. The capacity of an Internet connection is referred to as its bandwidth, and is measured in bits of data per second, a bit being an on or off, 1 or 0 signal. A thousand bits is a Kilobit (Kb), a million bits is a Megabit (Mb), a thousand million bits is a Gigabit (Gb) etc. However, data files are measured in Bytes, KiloBytes (KB), etc, with a Byte calculated as eight bits.

So, a 1MB file is 8,000,000 bits and, in theory, will take 200 seconds (3 minutes 20 seconds) to transfer over a perfect 40kb/s (40,000 bits per second) connection.

Always bear in mind that your connection is constrained by the slowest component of the network and the amount of data being transmitted across it at the time. Bottlenecks on the other end of the link and even en route may also affect transmission times, and imperfect connections can lead to errors and delays. Some transmission devices and software compress files, reducing the amount of data and transmission time, but additional data is added to the file size by network and transmission protocols.

Shared and dedicated bandwidth

Broadband connections can be divided into two major categories: shared and dedicated. Shared Internet connections include DSL and Cable broadband connections. Dedicated connections are provided by leased lines such as E1, T1.

Dedicated bandwidth

Dedicated bandwidth means that the bandwidth speed that you subscribed for is committed for your exclusive use. You are guaranteed that the Bandwidth (or speed) that you signed up can always be achieved 24 hours a day regardless of total network utilization at any given time. That means if you signed up for dedicated bandwidth of 512/512kbps, you will always be able to receive downloads up to 512kbps if your network requires it.

Shared bandwidth

Shared bandwidth means that the bandwidth speed that you signed up for is used collectively between yourself and other users on that service plan. Your ISP will endeavour to achieve the minimum set speed on the service level agreement but maximum speeds are only possible when other users in your service plan are not active. This has great advantages of having the ability to have higher speeds during non peak times and when the network is underutilized, without having to purchase dedicated bandwidth.

For example, if an ISP has a backbone connection to the Internet with 155 Mbps of capacity to be allocated to 100 customers, this can be done in two ways. First is to

provide a dedicated access to each customer, limiting the speed to 1.5 Mbps per customer. That way if all users were running at their maximum rate, the capacity of the backbone connection would not be exceeded. However, ISPs often offer each customer *"up to"* 10 Mbps so that if it is only 15 customers running their connections flat out downloading big files or video, there is still plenty of capacity for everyone. But what if all 100 want to download a video simultaneously? There's only 155 Mbps available, so each user get throttled at 1.55 Mbps.

This explains why your broadband connection seems to work faster some times and slower at others. The slow times tend to be when the most users are online and running high bandwidth applications. Even more dramatically, some ISPs might try to spread that backbone connection to over 1,000 users, not 100. During periods of very high usage, your share of the bandwidth could be as low as 150 Kbps. Remember, the service provider is offering "up to" 10 Mbps, not any particular speed at any particular time.

As your connection speed decreases, download times increase and some applications may start to sputter. VoIP telephone calls and video feeds, including video conferencing, are particularly sensitive to bandwidth congestion. Shared bandwidth services are generally offered on a "best effort" basis, with no guarantee of performance, packet loss, latency or even availability.

Internet Terms

Bandwidth: In the context of computer science, bandwidth can be used to refer to a measure of the information carrying capacity of a communication line. It is often used as a synonym for data transfer rate - the amount of data that can be carried from one point to another in a given time period (usually a second). This kind of bandwidth is usually expressed in bits (of data) per second (bps).

Broadband: This is a term used to depict a data rate greater than the ISDN basic rate. It is the generic term for high-speed digital Internet connections, such as wire line, DSL or cable modems and wireless 3G technologies. Broadband service is 'always on' so you do not have to dial-up for a connection. Broadband is capable of supporting a variety of voice and data applications like voice telephony, internet access, pay TV and multimedia services.

Download; (or data downloaded) is any data retrieved from another computer on a network, for example, text, pictures or sound. Viewing a page on the internet is downloading data from another computer.

Upload; to upload is to for example send text, pictures, sound files or software program via telecommunication network to another computer.

MB; or Megabyte (MB) is the term used to describe a measure of data. A MB is equal to 1,048,576 bytes, or roughly one million bytes. As a guide:

- One can view approximately 20 pages on the internet for each MB of download;
- An average four minute MP3 (music file) is approximately four MB; and
- A five minute movie trailer can be as much as 30 MB.

Modem; A modem short for MODulator - DEModulator is the device used to connect a computer to a telephone line. One can have a dial up modem for a dial up connection or a USB modem for broadband users.

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Acknowledgement

This Fact Sheet was developed by Teknobyte (Kenya) for the Consumer Education Outreach Programme by the Communications Commission of Kenya.

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