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Internal Assessment Test 1 – March 2018

Sub:	Multimedia communication					Sub Code:	10EC841	Branch:	TCE	
Date:	12/3/2018	Duration:	90 min's	Max Marks:	50	Sem / Sec:	VIII		OBE	

	Answer any FIVE FULL Questions	MARKS	CO	RBT
1 (a)	List different types of multimedia networks and explain any two networks in detail with relevant schematic.	[10]	CO1	L2
2 (a)	Determine the propagation delay associated with the following communication channels (i) A connection through a private telephone network of 1 km, (ii)A connection through a PSTN of 200 km, (iii)A connection over a satellite channel of 50,000km.Assume that the velocity of propagation of a signal in the case of (i) and (ii) is 2x108 m/s and in the case of (iii) is 3x108 m/s.	[04]	CO1	L2
(b)	Explain briefly interactive applications over the internet.	[06]	CO1	L2
3 (a)	Define the term multimedia communication. State the basic form of representing different media types.	[10]	CO1	L2

4 (a)	Explain with neat diagrams, the interactive television application for both cable and satellite network.	[07]	CO1	L2
(b)	Derive the maximum block size that should be used over a channel which has mean BER probability of 10^{-4} if the probability of a block containing an error and hence being discarded is to be 10^{-1}.	[03]	CO1	L2
5	Explain clearly different types of text data representation.	[10]	CO1	L2
6	Explain the following: i) Quantization levels ii) 4:2:2 format iii) Raster scan principles iv) Aspect ratio	[10]	CO1	L2
7 (a)	Assuming the bandwidth of a speech signal is from 50 Hz through to 10 kHz and that of a music signal is from 15 Hz through to 20 kHz, derive the bit rate that is generated by the digitization procedure in each case assuming the Nyquist sampling rate is used with 12 bits per sample for the speech signal and 16 bits per sample for the music signal. Derive the memory required to store a 10 minutes passage of stereophonic music.	[3]	CO1	L2
(b)	With the aid of a diagram, explain how an image produced by a scanner or digital camera is captured and stored within a computer memory?	[7]	CO1	L2

IAT-1 Solutions

(1)

(a) List different types of multimedia networks and Explain any two networks in detail with relevant Schematic

Ans

There are basically 5 types of multimedia communication networks that provide multimedia communication Services:

→ Telephone N/w

→ data N/w

→ broadcast television network

  → ISDN: Integrated Service digital n/w

  → broadband multiservice networks

Broadcast Television N/w:

This n/w are used to distribute programs out wide geographical areas. In case of larger areas, a satellite n/w is used to broadcast while in towns or a city a cable n/w is used
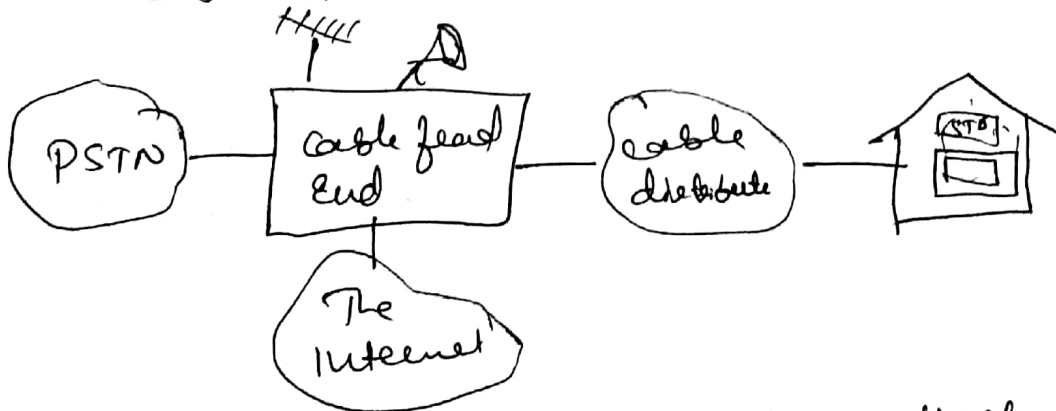
As the fig shows the Set-top-box attached to the Cable distribution n/w provides not only control of the television channel that are received but also access to other services. The low bit rate channel is used to create Connect the Subscriber to the Internet Cable

distribution n/w provide access to multimedia communica
Services that are available with PSTN & Internet.

Integrated Service digital N/w:

ISDN is designed to provide PSTN user with the capability of additional service. This allow users Either to have two different telephone calls in progress Simultaneously or two different call such as telephone call & a data call with an ISDN the access circuit is known as a digital Subscriber line (DSL)
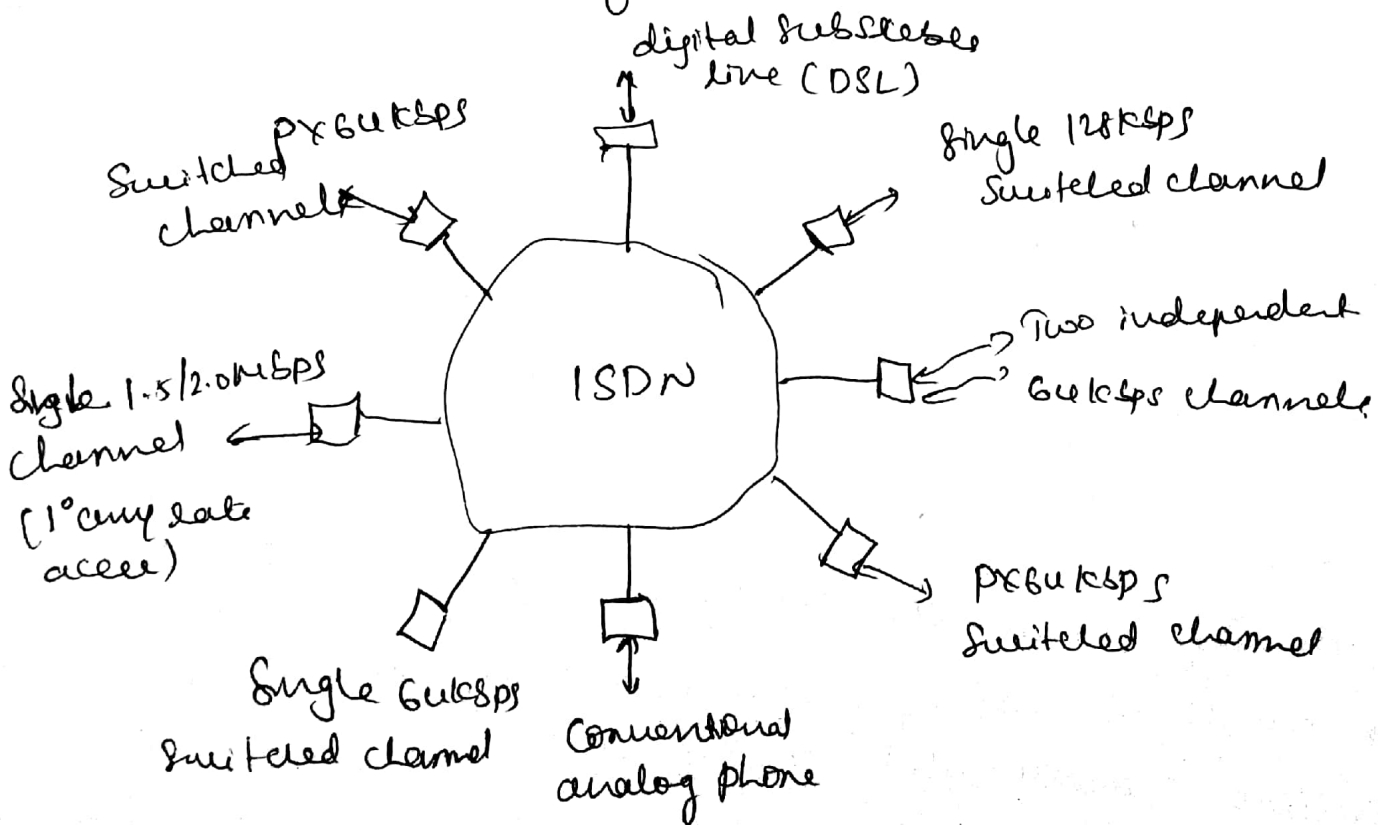
The digitalization of a telephone quality analog speech signal produces a constant bit rate binary stream of 64kbps usually effered to as bitstream hence the basic DSL of the ISDN is known as basic rate access (BRA) which supports two 64kbps channels. The two Separate 64kbps bitstream exits a single 128 kbps stream required an additional electronic box to perform the aggregation function.

digital Subscriber line (DSL)

2×64kbps Switched channels

Single 128kbps Switeled channel

Single 1.5/2.0MBps channel (1° amy rate access)

Two independent 64kbps channels

ISDN

Single 64kbps Switeled channel

Conventional analog phone

2×64kbps Switeled channel

2)

(a)

(i)

Propagation delay $T_p = $ physical equation / velocity of propagation

$$T_p = \frac{10^3}{2 \times 10^8} = 5 \times 10^{-6} s$$

(ii) $T_p = \frac{200 \times 10^3}{2 \times 10^8} = 10^{-3} s$

(iii) $T_p = \frac{5 \times 10^7}{3 \times 10^8} = 1.67 \times 10^{-1} s$

(b) Explain briefly interactive application over the internet

The internet is also used to support a large of interactive applications the most widely used for interactive is world wide web (www) as web server. The total information stored on all server is equivalent to a vast library of

Internet

PCS with browser N/w

ISPs

Si O LAN

Indeer

WWW server

MIS Connected to LAN as ISP N/w
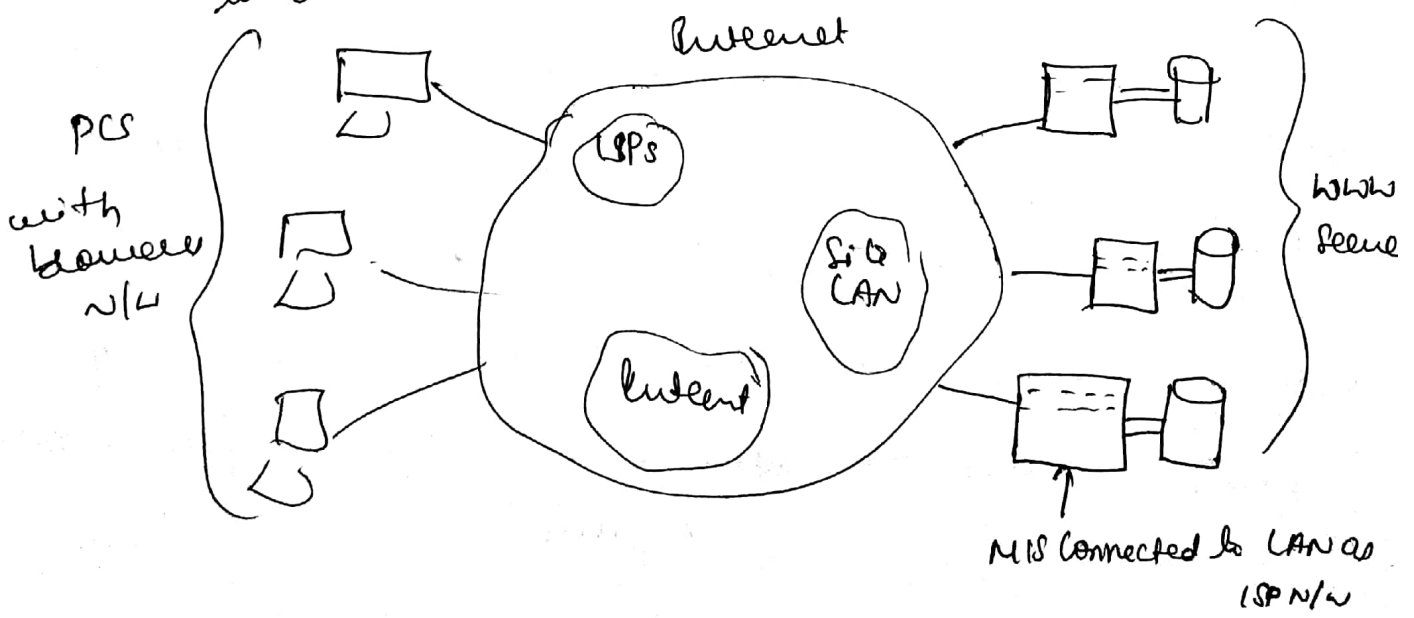
Each document comprises a linked set of pages and the linkages b/w the pages are known as hyper links.

In applications such as home shopping, home banking & so on, generally known as teleshopping & telebanking a client may wish not only to browse through the information site.

(3) multimedia communication embraces a range of application and networking infrastructure. the term multimedia is used to indicate the information or data being transferred over the n/w may be comprised of one or more of the following media types

Text: Text include both unformatted text comprising strings of character from a limited character set and formatted text strange for the structure access & presentation of electronic documents

Images: Image includes digitized image of documents & pictures it also comprises of computer generated images lines, & circles

Audio: Audio includes both low fidelity & high fidelity speech like used in telephony & stereophonic music are used with compact disc. respectively

Video: video includes short sequence of moving images known as video clips & complete movies & films

(4)

(a) Broadcast television n/w includes cable, satellite & terrestrial n/w. The STB associated with these n/w also has a modem within it also the SPS provide low & high bit rate connections to PSTN & internet simultaneously respectively.

By connecting appropriate terminal equipment to STB a broad telephone & soon the Subscriber is able to gain access to all the Services through PSTN & the internet.
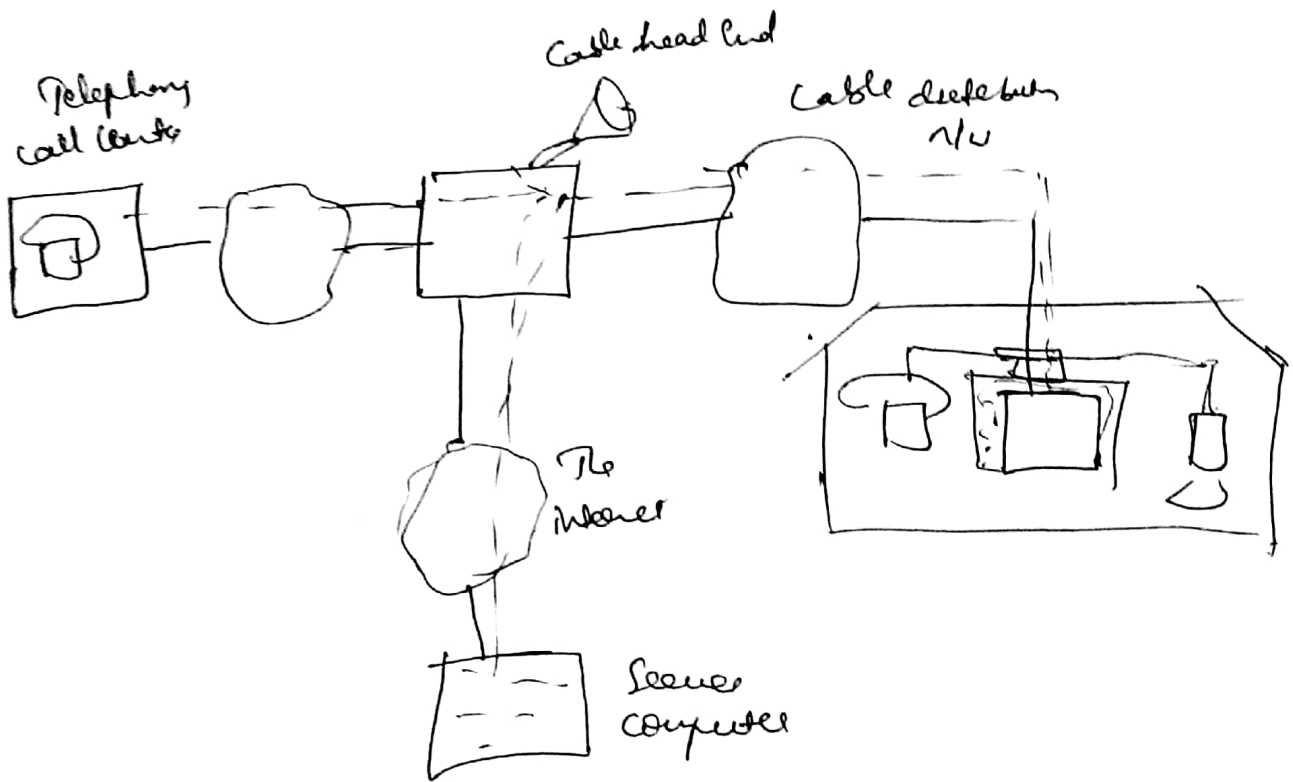
Fig. Cable distribution N/W

A similar set of Services are available through satellite & terrestrial broadcast n/w, Except that the STB associated with these n/w require a high speed modem to provide the connection to the PSTN & the internet

(3)

Ans

$$P_B = 1 - (1-p)^N$$

$$0.1 = 1 - (1-10^{-4})^N \quad \Rightarrow \quad N = 980 \text{ bits}$$

$$P_B = N \times p$$

$$0.1 = N \times 10^{-4} \quad \Rightarrow \quad N = 1000 \text{ bits}$$

(5)

3 types of text documents

(i) unformatted text:

This is also known as plain text & enable paper to be created which comprise strings of fixed sized character from a limitted character set

(ii) formatted text:

This is also known as rich text & enables paper & complete document to be created which comprise of strings of character of different styles, size & shape with tables, graphics & image inserted at appropriate points

(iv) hyper text:

This Enable an integrated set of documents to be created which have defined linkage b/w them. It is used to create an Electronic version of such document with the index, description of department course on offer.

and the last which Ends at the bottom right corner this type of Scanning is called progressive scanning.

$N = 525$ (NTSC) & 625 (PAL/CCIR/SECAM)

frame refresh rate = 60 times/sec (NTSC)

= 50 tree (sec) (PAL/CCIR/SECAN)

(iv) Aspect ratio:

Both the no of pixels per scanned line & no of lines per frame vary. the actual no used is determined by the aspect ratio of display screen. Thus the ratio of screen width to screen height the aspect ratio of current television tube is 4/3 with older tube 16/9 with wide screen television tube.

2)

(a)

(1) Bit rate: Nyquist sampling rate = 2 f_{max}

Speech: Nyquist rate = 2×10kHz = 20kHz

Hence with 12 bit per sample bit rate generated

= 20k × 12 = 240 kbps.

music: Nyquist rate = 2×20kHz = 40kHz

bit rate = 40k × 16 = 640 kbps (mono)

= 2 × 640 kbps ≈ 1280 kbps (stereo)

(ii) memory required: bit rate × time /8 byte

= $\dfrac{1280 \times 10^3 \times 600}{8}$ = 96 Mbyte

(6)

(1) If V_{max} is the max positive & negative signal amplitude & n is the number of binary bits used then the magnitude of each quantization interval q is given by

$$q = \frac{2 V_{max}}{2^n}$$

The ratio of peak amplitude of a signal to its min amplitude is known as dynamic range of signal

$$D = 20 \log_{10} (V_{max}/V_{min}) \, dB$$

(ii) 4:2:2 format

In standard however a line sampling rate of 13.5MHz for luminance & 6.75MHz for the two chrominance signals was selected, both of which are independent of particular scanning standard.

625-line system the total line sweep time is 64ms with a blanking time of 12ms which also yield an active line sweep time of 52ms.

$$52 \times 10^{-6} \times 13.5 \times 10^{6} = 702 \text{ samples per line}$$

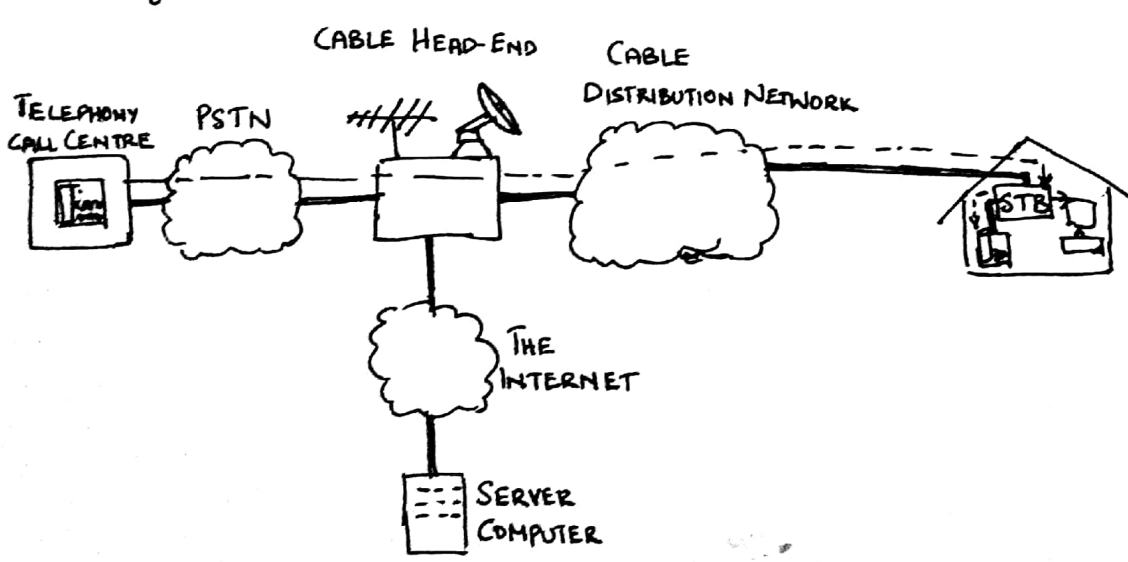(iii) Raster-Scan principle

The picture tube operate using a raster scan principle. They involve a finely-focused electron beam being scanned over the complete screen. Each complete scan starts at the top left corner of the screen &
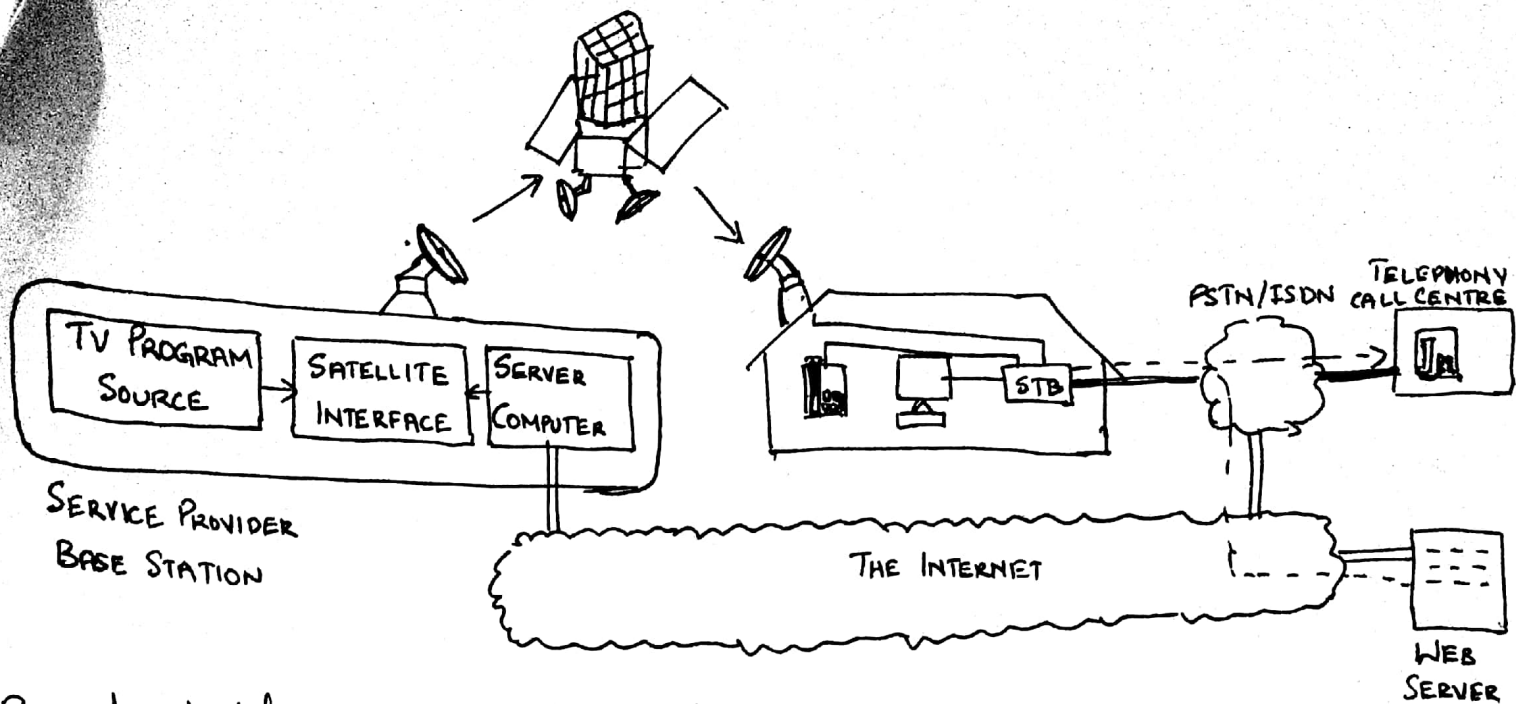
Scanned by CamScanner

3.

(a) Multimedia communications embraces a range of applications and networking infrastructures. The term "multimedia" is used to indicate that the information/data being transferred over the network may be composed of one or more of the following media types:

(i) Text: This includes both unformatted text, comprising strings of characters from a limited character set, and formatted text strings are used for the structuring, access and presentation of electronic documents.

(ii) Images: These include computer-generated images, comprising lines, curves and circles, and digitised images of documents and pictures.

(iii) Audio: This includes both low-fidelity speech, as used in telephony, and high-fidelity stereophonic music as used with compact discs.

(iv) Video: This includes short sequences of moving images and complete movies/films.

4.

(a)

Service Provider Base Station — TV Program Source → Satellite Interface ← Server Computer. The Internet. STB, PSTN/ISDN, Telephony Call Centre, Web Server.

* Broadcast television networks include cable, satellite, and terrestrial networks.

* The basic service provided by these networks is, of course the diffusion of both analog and digital television programs.

* In a cable network, the STB provides both a low bit rate connection to the PSTN and a high bit rate connection to the internet.

* Hence by connecting appropriate terminal equipment to the STB - a keyboard, telephone etc the subscriber is able to gain access to all the services provided through the PSTN and the internet.

(b) P_B = Probability of block containing an error

$P_B = 1 - (1-P)^N \simeq N \times P$

P = BER Probability ; N = No. of bits in a block

$10^{-1} = N \times 10^{-4}$

$\therefore N = \dfrac{10^{-1}}{10^{-4}} = 1000 \text{ bits}$

5. Essentially, there are three types of text that are used to produce pages of documents.

(i) Unformatted text: This is also known as plain text and enables pages to be created which comprise strings of fixed-sized characters from a limited character set.

(ii) Formatted text: This is also known as richtext and enables pages and complete documents to be created which comprise of strings of characters of different styles, size and shape with tables, & graphics, and images inserted at appropriate points.

(iii) Hyper text: This enables an integrated set of documents (each comprising formatted text) to be created which have defined linkages between them.