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A Telecommunications technology **transmits** information by **electromagnetic** means over media such as telephone **wires** or radio **waves**. The information may be voice, facsimile, data, radio, or television signals. The electronic **signals** that are transmitted can be either **analogue** or **digital**. The advantages of digital transmission are high reliability and low cost. Digital **switching systems** are much cheaper than analogue systems.

In analogue **modulation**, the signals are transmitted directly (without **converting** them to digital form) by **amplitude modulation** or **frequency modulation**. For digital transmission the analogue signals must be converted to a digital form. Then the digitized signal is passed through a **source encoder**, which reduces redundant **binary** information. After source encoding, the digitized signal is processed in a **channel encoder**, which introduces **redundant** information that allows errors (**degradation** by **noise** or **distortion**) to be detected and corrected. The encoded signal is made suitable for transmission by modulation onto a **carrier wave**. When a signal reaches its destination, the device on the receiving end converts the **electronic** signal back into an understandable message – sound on a telephone, images on a television, or words and pictures on a computer.

B There are three main methods of electromagnetic signal transmission: *wire*, *radio* and *optical*.

wire transmission

amplify • attenuation • coaxial cable • copper wire • metallic-pair circuit
multipair cable • open-wire pair • repeater • restore • retransmit • single-wire line

radio transmission

antenna • dish • electromagnetic wave • microwave • radio wave • receiver
reflected propagation • satellite • surface propagation • transmitter • transponder

optical transmission

fibre optic cable • high bandwidth • interference immunity • laser • lightweight
light-emitting diode (LED) • low attenuation • low cost • wavelength

C Telecommunications is the fastest growing segment of technology today. Telecommunications technologists are needed to plan, install and maintain state-of-the-art telephone systems, cable TV and computer networks. Although technologists have knowledge of theoretical topics, they tend to focus on solving practical design and application problems. Training covers a wide range of telecoms-related topics. Here is the content from one such course:

COURSE CONTENT

- Part 1: Operating Systems
- Part 2: Analogue Communications
- Part 3: Telecommunications Fundamentals
- Part 4: Telecommunications Fundamentals Lab
- Part 5: Digital Electronics
- Part 6: Telecommunications Networking
- Part 7: Fundamentals of Optical Communications
- Part 8: Data Communications Networking

TASKS

1 Match each of the following words with its definition.

wire	a device which maps the binary strings into coded bits or waveforms for transmission
wave	a device which maps the source into a set of binary strings
analogue	a system in which data is represented as 0 or 1
digital	a system in which data is represented as a continuously varying voltage
amplitude modulation	a thin piece of metal for conducting electrical current
frequency modulation	a wave suitable for modulation by an information-bearing signal
source encoder	an electric, electromagnetic, acoustic, mechanical or other form whose physical activity rises and falls as it travels through a medium
channel encoder	the deterioration in quality, level, or standard of performance
degradation	to fail to reproduce accurately the characteristics of the input
distort	where audio signals increase and decrease the amplitude of the carrier wave
carrier wave	where voltage levels change the frequency of a carrier wave

2 The following words are taken from three modes of transmission: wire, radio and optical. Link each term with the most appropriate mode of transmission.

antenna • coaxial cable • copper wire • fibre optic cable
laser • light-emitting diode • microwave • repeater • satellite
single-wire line • transmitter • wavelength

wire

radio

optical

3 The following extract is taken from a description for a telecommunications technology course. Complete the text by choosing a suitable word or phrase from the box.

sharing • laser • information • electromagnetic transmission
direct • converting analogue • transmit signals

TELECOMMUNICATIONS TECHNOLOGY CERTIFICATE COURSE

COURSE NAME	COURSE DETAILS
Telecommunications Fundamentals	Introduction to the _____ of information
Telecommunications Fundamentals Lab	Hands-on practical experiments to _____
Analogue Communications	_____ transmission of signals
Digital Electronics	_____ signals
Fundamentals of Optical Communications	The advantages of _____ technologies
Fundamentals of Telecommunications Networking	Introduction to _____ information
Data Communications Networking	Sharing _____ between networks

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A A wide variety of information can be **transferred** through a telecommunications system, including **voice** and **music**, **still-frame** and **full-motion** pictures, **computer files** and **applications**, and **telegraphic data**.

The telephone is an **instrument** used for **sending** and **receiving** **voice messages** and **data**. Most phone **calls** involve two people, but the phone **network** can also be used to pay bills and **retrieve** messages from **answering machines**. Private individuals will usually have their own **phone line**; a large business will usually have its own **switching machine**, called a **Private Branch Exchange (PBX)**, with many lines, all of which can be reached by **dialling** one number.

Radio **transmission broadcasts signals** that are intended for general public **reception**. With an **omnidirectional antenna**, radio signals are **transmitted** over a wide area. In a point-to-point radio **channel**, a **directional** transmitting antenna focuses the wave into a narrow **beam**, which is directed toward a single receiver. Broadcasts may be **audible** only, as in radio, or **visual** or a combination of both, as in television.

B Two applications of telecoms are *telephony* and *television*.

Telephony

A **videophone** is a personal **video camera** and **display**, a **microphone** and **speaker**, and a **data-conversion device**.

A **cordless** telephone is a **device** which plugs directly into an existing telephone **jack**, allowing limited **mobility** within the home, garden or office.

Telephony has been revolutionized by **cellular (cell or mobile)** telephones, which are personal **portable** devices.

Facsimile, or **fax**, refers to the **transmission** of print: text, fixed **images** or **drawings** by wire or radio channels or undersea **cable**.

Television

aerial • antenna • broadcast • cable television • dish
relay station • television set • television station • visible

C Mobile telephony is revolutionizing how we use the phone. Look at the range of features offered by the MobiPhone.

THE MOBIPHONE WORLD

THE MOBIPHONE WORLD is the latest in a line of WAP "smartphones" combining the best of both worlds – mobile phones and handy PDAs. All phones offer the full complement of features,

- 14.4 kbps data and fax transmission
- a vibrating alert
- a clock and alarm
- a currency converter
- a built-in personal organizer that holds up to 1,000 short memos.

THE TOP-OF-THE-RANGE World 1000 is GPRS enabled (General Packet Radio Service) offering:

- 'always-on'
- higher capacity
- Internet-based content
- packet-based data services.

This enables services such as colour internet browsing, email on the move, powerful visual communications, multimedia messages and location-based services. With an LCD screen displaying up to ten times the amount of text you'd get on a traditional cell phone, the MobiPhone is tomorrow's mobile phone today.

Also available: an infra-red computer connection.

Dimensions: 103mm × 51mm × 16mm (including battery). Weight: 69g (including battery).

TASKS

1 Circle *all* the correct answers that apply.

- A telecommunications system can transfer
a voice b pictures c computer files d energy
- The telephone is an instrument used for
a sending messages b switching messages c receiving messages
d retrieving messages
- Broadcast signals can be
a tactile b audible c visual d a combination of all three
- A videophone combines
a a video camera b a display c a microphone d a speaker
- Fax can be used to transmit
a sounds b moving pictures c drawings d images
- A cordless phone
a plugs into a jack b allows unlimited mobility c can be used within the home
d is portable

2 Match a word in the left-hand column with a word on the right to form ten phrases from the field of telecommunications.

Now complete the following sentences using phrases from the table opposite.

- The telephone can be used to pay bills and _____ from _____.
- With an omnidirectional antenna, _____ can be transmitted over a wide area.
- A videophone incorporates a _____ and display, a microphone and speaker.
- A _____ allows limited mobility in and around the home.
- _____ allows access to many television stations.

answering	antenna
radio	camera
video	jack
relay	machine
cable	messages
television	phone
retrieve	set
transmitting	signal
cordless	station
telephone	television

3 Below is an extract from the review of the newly released MobiPhone World. Complete the text using the words/phrases in the box below.

alert • browsing • cell phone • clock and alarm • currency converter
email • organizer • PDA • screen • weight

MobiPhone World 1000 is the latest product from MobiCom. It is a fully-featured, future-proof mobile, packed with exciting applications. Not only a mobile phone, it doubles as a handy (a) _____. As it is GPRS enabled, you can collect your (b) _____ while you are on the move. In addition, the colour internet (c) _____ makes word wide web searching a new experience. This is enhanced by the new LCD (d) _____ which displays up to ten times the amount of text you'd get on a traditional (e) _____. When you go abroad, you don't need

to worry about missing that important meeting as the World 1000 comes with a (f) _____. You can also be one step ahead of the bank by checking how much you'll get for your money with the (g) _____. And when you get to the business meeting, you won't disturb your neighbours, as the vibrating (h) _____ lets you know about incoming calls. You can even write short notes of the meeting on the built-in personal (i) _____.

With a (j) _____ of just 69 grams, the MobiPhone World 1000 is a must have.