[2]UNIVERSITY ZIANE ACHOUR OF DJELFA November 2018

TELECOMMUNICATIONS

Telecommunications is a general term used for a wide spectrum of technologies that send information over distances. **Tele-** is a prefix meaning **"from a distance"**. Telecommunication is any transmission, emission, or reception of signals, writing, images, sounds, or intelligence of any nature by wire, radio, visual, or other electromagnetic systems. It is the assisted transmission of signals over a distance for the purpose of communication. It includes all telephony technologies, such as mobile phones, land lines, satellite phones, voice over Internet protocol as well as radio, television and networks.

Today, telecommunications is associated with modern technologies. Nevertheless, the use of smoke signals used by the American Indians is a kind of visual telegraph - it is an ancient and primitive form of telecommunication. There were others, of course, but let us focus on the modern term, the telecommunications of today. However, some historical data first!

In the **19th century**, with the numerous discoveries in the field of electricity, telecommunications devices became more sophisticated. Those were telegraph, Morse code, signal lamps, a heliograph . In the **20th century**, telecommunications reached beyond our planet. In June 1969, the world watched and listened as astronauts walked on the moon. Twenty years later the pictures of Neptune sent from the Voyager 2 travelled over three billion miles (4.8 billion km) to reach us in only a few hours. People today have multiple ways to see and hear what is going on almost anywhere in the world in real time. Satellite technology, television, telephone, the Internet - they all keep the globe connected either by voices or pictures.

A telecommunication system consists of **three basic elements, i.e. a transmitter, information and a signal.** For example, in a radio broadcast the broadcast tower is the transmitter, free space is the transmission medium and the radio is the receiver. Telecommunication systems are often two-way, i.e. a single device acts as both a transmitter and a receiver or transceiver. A mobile phone is an example of a transceiver.

The importance of telecommunication services in the infrastructure of a country is universally recognized. But what is their internal order of importance? The late **Arthur C. Clarke**, author of 2001…A Space Odyssey and the first person to conceive the idea of geosynchronous satellites, tried to answer the question in a recent address. He listed a number of services in the following order:

I. the telephone

II. radio and TV

III. telex

IV. data networks.

"A reliable telephone system must surely have the first priority," said Clarke, "for it affects every aspect of life ... personal, business, government. It will be a long time, but not as long as you think, before everybody has a telephone. But with a telephone in every village we can have the next best thing".

He pointed out that with the introduction of International Direct Dialling in recent years, the power of the state to control news was broken. Private individuals can now speak to each other across frontiers.

Clarke placed radio next in his list of priorities because he considered it central to spreading information and establishing a national consciousness. He considered that radio was nowhere near the end of its development, an opinion which is confirmed by the rapid growth and enormous success of cellular radio. He saw at least two major developments in the field of radio technology: the use of built-in solar cells to replace batteries and the use of direct broadcasting satellites to give perfect signal reception all over the world. It is for us to see how right he was!

DISCUSSION QUESTIONS

1. What does the term telecommunication mean?
2. What is telecommunication?
3. What technologies does telecommunication include?
4. When did the fast growth of telecommunications start?
5. Why?
6. What revolutionary achievements concerning telecommunications happened in the 20th century?
7. What does every telecommunication system consist of?
8. What is a transceiver?
9. How did Arthur Clarke list the telecommunication services?
10. Explain the order of the services according to Clarke.

TERMS AND DEFINITIONS

point-to-point communication - communication between one transmitter and one receiver
broadcast communication - radio communication between one powerful transmitter and numerous receivers
analog(ue) signal - the signal is varied continuously with respect to the information; the information in the signal is degraded by the noise
digital signal - the information is encoded as a set of discrete values (ones and zeros); the information remains intact unless the noise exceeds a certain threshold
network - transmitters, receivers or transceivers communicating with each other
channel - a division in a transmission medium resulting in the possibility of sending multiple streams of information
modulation - the shaping of a signal to convey information

SCRAMBLED SENTENCES

(begin the sentence with the word in a capital letter):
1. Telecommunication, point-to-point communication, and, one transmitter, is called, because, over a phone line, it is, between, one receiver

_____
_____
_____
_____

2. The function, is, the signal, of the transmission medium, to carry

_____
_____

3. converts, information, it, A transmitter, takes, to a signal, and

4. multiple streams of, a transmission medium, so that, A channel, it can be used, is, information, a division in, to send

5. analogue, can be, digital, Signals, either, or

6. through radio broadcasts, broadcast communication, Telecommunication, between, is called, and, because, numerous receivers, it is, one powerful transmitter

7. the signal, with respect to, an analogue signal, continuously, the information, In, is varied

8. is, that, receivers, with each other, or transceivers, a collection of transmitters, communicate, A network

9. the information, In, discrete values, a digital signal, as a set of, is encoded

OPTICAL FIBERS

Optical fiber can be used as **a medium for telecommunication and networking** particularly for long-distance communications (data, voice & video). Optical fibers convert electrical pulses into pulses of light. Light impulses are transmitted through the optical fibers and re-converted into electrical impulses at their destination.

They are **thinner than a human hair** and are made of glass or plastic. They are designed to guide light along its length and they work even if they are bent around corners, laid underground or on the ocean floor. Fiber-optic communications are used not only to transmit over longer distances but due to their higher data rates they are more useful than other forms of communications. Signals travel along them with **less degradation**, and they are **immune to electromagnetic interference.**

Most fibers are made from **silica**, which is very cheap and occurs in several different natural orms, e.g. quartz and common sand. They are relatively cheap, flexible and lightweight. A 500 m of optical fibers weighs about 25 kg, while a coaxial cable of the same length weighs 5 tons.

However, joining lengths of optical fiber is more complex than joining electric wire or cable because the ends of the fibers must be carefully **spliced**16 together. Nevertheless, they are less expensive than copper wires and, unlike electrical signals in copper wires, light signals from one fiber do not interfere with those of other fibers in the same cable.

In spite of high investment cost, the need for more expensive optical transmitter and receivers, their cost is much more economic than old coaxial cables and communication systems are now unthinkable without fiber optics. Transmitter and receivers (laser and photodiodes) turn out cheaper than electric circuitry as their capacity is much superior. The cost of regeneration in electric long distance transmission systems is completely impractical for modern communications. Optical fibers cannot carry electric power to operate terminal devices.

optical fibers are widely used in **illumination applications**, e.g. as light guides in **medical imaging** to view objects through a small hole (bronchoscopes, endoscopes, laparoscopes), **mechanical imaging** to inspect anything hard to reach (mechanical welds in pipes and engines, jet engine interiors), in some buildings they are used **to route sunlight** from the roof to other parts of the building, optical fiber illumination is also used for **decorative applications** (signs, art, artificial Christmas trees), etc.

Due to the above advantages, fiber optics can be seen in many industries, particularly in telecommunications and computer networks. It has **an enormous bandwidth**, a bandwidth which is practically unlimited. Just one more remark - no fiber, no Internet!

MATCH THE ADVANTAGES OF OPTICAL FIBERS BELOW WITH AN APPROPRIATE EXPLANATION:

1	complete electrical isolation	A	when fiber is produced in large quantities, the price will be relatively low
2	very large information bandwidth	B	cables can be easily laid and do not occupy much duct space[17]
3	high immunity for interference	C	suitable for crossing places which contain lots of electrical apparatus giving off stray signals; difficult to "tap"
4	low material cost	D	a single silica fiber can carry hundreds of thousands of telephone channels
5	small and light cables	E	signal fades less so that repeaters can be more widely spaced