UNIT 6: SOME TECHNICAL CONCEPTS

UNIT STRUCTURE

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6.4 Digital video broadcasting
6.5 Terrestrial transmission, cable and satellite transmission
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6.1 LEARNING OBJECTIVES

After going through this unit you will be able to:

- explain the concept of satellite communication
- describe digital video broadcasting
- define the terms terrestrial transmission, cable and satellite transmission.

6.2 INTRODUCTION

This is the sixth unit of your course on Television. In the preceding units you have come across several basic concepts related to the television media. But there are some technical terms and concepts which have not yet been elaborated.

As such, some very important concepts like satellite communication, digital video broadcasting, satellite and cable transmission, terrestrial transmission etc. which are integral to television technology are being discussed in this unit for your benefit.

Let us begin the unit by discussing what satellite communication is.

6.3 SATELLITE COMMUNICATION

Communication Satellites have been around since 1958. A communication satellite is a spacecraft that orbits the Earth and relays messages, radio, telephone and television signals. Stations on the ground, called earth stations, transmit signals to the satellite, which then relays the signal to other earth stations. As a modern implement of advanced technology, communication satellites are proving to be very useful in bringing the people of the world together. Earlier, communications between people used to take days or even months but now with the help of advanced technologies it can take place within minutes or seconds by using satellites. Communication satellites are launched in the space with the help of rockets or carried into space by the Space Shuttle. Once the satellites reach space the small engines on the satellites guide it into orbit and help keep it revolving round the earth. Most communication satellites are placed in orbit at an altitude of 22,300 miles above the Earth. This is known as a **geostationary** or synchronous orbit. This allows the satellite to orbit the Earth at the same speed as the rotation of the Earth. As a result, the satellite appears to be stationary above the same location on Earth. Intelsat Telecommunication is the biggest worldwide satellite communication network. It has over 110 nations, and operates powerful communications satellites, such as Intelsat 6, over the Atlantic, Pacific, and Indian Oceans. The Intelsat spans the globe, and domestic satellites such as the USSR's Molniya satellites. Western Union's Westar, and Canada's Anik serve individual countries. The Intelsat V is the latest in its space-craft series; it can handle 12,000 telephone circuits and two colour television transmission simultaneously.



Communication satellites placed in orbit at an altitude of 22,300 miles above the earth are known as **geostationary satellites.** This allows the satellites to orbit the earth at the same speed as the rotation of the earth.

Satcoms, a different name for communication satellites are being used increasingly to handle long distance telephone, television, and other transmission around the world.

Communication satellites are more economical to build and to use than more traditional terrestrial methods. For example, in 1983, seven undersea cables linked North America and Europe. The last cable cost $175 million. In comparison, a modern communications satellite costs roughly $80 million (including payment for launching it into orbit). It handles more than 3 times as many calls.

The use of satellite technology, particularly in the use of communication satellites, has grown rapidly in the past thirty years. It has made communication across the world fast and cheap. There has been spin- off uses too like geographical and geophysical mapping. More and more satellites are being launched each year to support new and growing uses for business, military and communication needs.



CHECK YOUR PROGRESS

Q.1. What is a Communication Satellite?

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Q.2. Name the biggest worldwide satellite communication network.

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Q.3. What is the other name for communication satellites?

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Q.4. What is a geostationary satellite?

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ACTIVITY - 6.1

1) Visit the local cable operator and ask him to show you how he receives and sends television signals.

2) Talk to the local cable operator in your area and find out which channels are free-to-air and which ones are pay-channels.

6.4 DVB: DIGITAL VIDEO BROADCASTING

Digital Video Broadcasting (DVB) is a transmission scheme based on the MPEG-2 video compression / transmission scheme. It utilises the standard MPEG-2 Transmission scheme. It is however much more than a simple replacement for existing analogue television transmission. In the first case, DVB provides superior picture quality with the opportunity to view pictures in standard format or wide screen (16:9) format, along with mono, stereo or surround sound. It also allows a range of new features and services such as giving subtitles, multiple audio tracks, interactive content, etc.

Digital broadcasting has the capacity to deliver multimedia in addition to television programmes. This can look like an electronic version of a 'magazine page' or a web page. It is either independent of the television programme or allied to it in some way. It can be a 'one-way' multimedia which displays pictures and information on screen. This can be superimposed or separated. It can be two-way multimedia which uses a return path system to the broadcaster allowing the viewer to interact directly with the broadcaster.

The DVB Project is an Alliance of about 250 to 300 companies which was originally of European origin but now turned into a worldwide project. Its objective is to agree to specifications for digital media delivery systems including broadcasting. It is an open and private sector initiative with an annual membership fee which is governed by a Memorandum of Understanding (MoU).

Until late 1990, digital television broadcasting to the home was thought to be impractical and costly to implement. However, in 1991 the broadcasters and consumer equipment manufacturers discussed how to form a concerted pan-European platform to develop digital terrestrial TV. Towards the end of that year, broadcasters, consumer electronics manufacturers and regulatory bodies came together to discuss the formation of a group to man the development of digital television in Europe.

This so-called European Launching Group (ELG) expanded to include the major European public and private media interest groups along with the consumer electronics manufacturers, common carriers and regulators. It

drafted the MoU, establishing the rules by which this new and challenging game of collective action would be played.

DVB is a European initiative. Equipment conforming to DVB standard is now in use on six continents and DVB is rapidly becoming the world-wide standard for digital TV. The DVB-S system is used across the world, though in some countries such as Japan and the United States other digital satellite systems are used as well as DVB-S. The DVB-C system is also widely used throughout the world. Although the turn over of digital terrestrial television throughout the world has been slower than digital satellite and cable, yet still the DVB-T system is the least widely used. It is estimated that more than 120 million DVB receivers have been deployed around the world.

After 18 months of study and testing India chose the DVB-T standard for Terrestrial Digital Broadcasting in July 1999. The state broadcaster, Doordarshan, started a pilot trial in Delhi during 2002, and then extended it other parts of the country.



CHECK YOUR PROGRESS

Q.5. What is DVB?

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Q.6. What are the advantages of DVB?

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Q.7. When did Doordarshan first start the Terrestrial Digital Broadcasting pilot trial?

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6.5 TERRESTRIAL TRANSMISSION, CABLE AND SATELLITE TRANSMISSION

Terrestrial transmission:

Terrestrial television (also known as over-the-air or OTA) is the traditional method of television broadcast signal delivery. The first long distance public television broadcast from Washington D.C in 1927 marked the history of terrestrial television broadcasting. Besides transmission by high flying planes moving in a loop using a system, there was virtually no other method of television delivery until the 1950s. It is only later that cable television arrived.

Terrestrial television channels are transmitted via ultra-high frequency (UHF). The audio and video signals of a television programme are broadcast through the air by a transmitter which superimposes the information in the camera's electronic signals in the carrier waves. The transmitter then amplifies the carrier waves by making them strong enough to be sent to a transmitting antenna. This transmitting antenna radiates the carrier waves in all directions which travels through the air to antennas connected to television sets or relay stations.

Microwave relay stations are tall towers that receive television signals and retransmit them after amplifying. These are sent as a microwave signal to the next relay station. Microwaves are electromagnetic waves that are much shorter than normal television carrier waves and can travel farther. The stations are placed about 50 km (30 mi) apart. Television networks once relied on relay stations in order to broadcast to affiliate stations located in cities which are far from the original source of the broadcast. The affiliate stations receive the microwave transmission and then rebroadcast it as a normal television signal to the local area. This system of transmission has now been almost entirely replaced by satellite transmission. In these transmissions networks send or uplink their program signals to a satellite that in turn downlinks the signals to affiliate stations.

These signals travel in straight lines rather like rays of light. When they fail to reach someone, it is often because of the shielding effect of mountains, hills or large buildings. As a result, hundreds of low-power relay stations have been built for analogue to fill in the gaps.

Some of the features of terrestrial transmission are as follows:

i. Antennae: They receive signals from the transmitters and send the same to the TV set through a cable. Television waves travel in straight lines rather like light rays. Consequently, wherever you live, the receiving aerial should be outdoors, as high as possible, and in the clear so that it gets the best direct signal.

ii. Masthead pre-amplifiers (boosters): These are mounted close to the aerial and help to improve picture quality if signals are weak. But they are not of much help if the transmission relay station is very far away.

Satellite & Cable Transmission:

The communication satellites are those satellites which receive television signals from a ground station. These satellites then amplify the received signals and relay them back to the earth over an antenna that covers a specified terrestrial area. These satellites circle the earth in a geosynchronous orbit, which means they stay above the same place on the earth at all times. However instead of a normal aerial antenna, receiving dishes are used to receive the signal and deliver it to the television set or station. The dishes can be fairly small for home use, while they can be large and powerful as those used by cable and network television stations.

Nowadays, satellite transmissions are extensively used for an efficient distribution of television and radio programs. These satellites transmit signals from one geographic location to another by networks, cable companies, individual broadcasters, programme providers, industrial, educational, and other organizations. Programs intended for specific subscribers are knitted in such a manner with an intension that the programmes can be received by the recipients with appropriate decoders.

Cable television (Cable TV) is a system of providing television and other services to consumers via signals transmitted directly to people's television sets through fixed coaxial cables as opposed to the over-the-air (OTA) method used in traditional terrestrial transmission in which a television antennae is used.

The main intention behind developing cable television in 1940s was to serve the shadow areas that are blocked from receiving signals from a station's

transmitting antenna. In these areas, a community antenna receives the signal which is then redistributed to the shadow areas by a coaxial cable. A coaxial cable is a large cable with a wire core or the recent types of fiber-optic cable that can transmit the wide band of frequencies required for television. Viewers in most areas can now subscribe to a cable television service which provides a wide variety of television programs and films. These programmes are adapted for television which are then transmitted by cable directly to the viewer's television set with the help of digital data-compression techniques. Digital data-compression techniques is a technique which converts television signals to digital code in an efficient way increasing the capacity of the cable to even 500 or more channels.

The cable operator not only provides pre-recorded programmes but also offers a number of television channels accessed through dish antennae and a host of other encoding and decoding equipment.

Satellite and cable broadcasting involves the satellite TV channel's earth station, a satellite, multi-system operators (MSOs) and small cable operators (SCOs). The satellite TV channels (eg. STAR TV, NDTV) uplink their programmes to the satellite. The satellite downlinks the programme to the dish antennae of an MSO. The MSO in turn uses decoders to unscramble the transmitted pictures. It then supplies the signals through a coaxial cable either to individual subscribers or to small cable operators (SCOs), who, in turn, use signal amplifiers to supply the signal to individual subscribers.



Encrypt:
To put information into a special code.

While some channels are free-to-air (FTA), some are pay channels. Free-to-air means that the provider does not **encrypt** the channels and anybody would be able to receive the signal. However, free to view means that the channel provider encrypts the channel but the MSO would have to decode the signal using a card in order to provide the signals to the subscriber. The channel may or may not charge the MSO (who in turn charges the subscriber). Pay channels are those that the subscriber has to pay to watch. For example, Doordarshan is a free-to-air, free-to-view channel. Star Plus, Sun TV etc are pay channels. We need to pay a certain amount to watch them.



CHECK YOUR PROGRESS- D

Q.8. What is cable television.

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Q.9. What is the basic difference between terrestrial and satellite transmission of television signals?

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Q.10. What do you mean by free-to-air (FTA) and pay channels?

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ACTIVITY 6.2

1) Visit the local cable operator and ask him to show you how he receives and sends television signals.

2) Talk to the local cable operator in your area and find out which channels are free-to-air and which ones are pay-channels.

6.6 LET US SUM UP

In this unit you have been introduced to the basic concepts of audio-visual media. Let us quickly recapitulate these concepts once.

- Terrestrial television (also known as over-the-air or OTA) is the traditional method of television broadcast signal delivery. Terrestrial television channels are transmitted via ultra-high frequency (UHF). These signals travel in straight lines rather like rays of light.
- Cable television (Cable TV) is a system of providing television and other services to consumers via signals transmitted directly to people's television sets through fixed coaxial cables,
- Satellite and cable broadcasting involves the satellite TV channel's earth station, a satellite, multi-system operators (MSOs) and small cable operators (SCOs).

6.7 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q No.1 : A communication satellite is a spacecraft that orbits the Earth and relays messages, radio, telephone and television signals. Stations on the ground, called earth stations, transmit signals to the satellite, which then relays the signal to other earth stations. Earlier communication between people was a very slow process and often used to take days or months but now as a result of advanced technologies it can be conducted within minutes or even seconds. This advancement is a result of communication satellites. Communication satellites are very useful in bringing people of the world together.

Ans. to Q No.2 : Intelsat Telecommunication is the biggest worldwide satellite communication network.

Ans. to Q No.3 : Satcom

Ans. to Q No.4 : A geostationary satellite is a satellite which orbits the Earth at the same speed as the rotation of the Earth. As a result, the satellite appears to be stationary above the same location on Earth.

Ans. to Q No.5 : Digital Video Broadcasting (DVB) is a transmission scheme based on the MPEG-2 video compression / transmission scheme which utilizes the standard MPEG-2 Transmission scheme.

Ans. to Q No.6 : The advantages of DVB are

a. DVB provides superior quality of picture with an opportunity to view pictures in standard format or wide screen (16:9) format, along with mono, stereo or surround sound.

b. It also allows a range of new features and services such as giving subtitles, multiple audio tracks, interactive content, etc. Sometimes the programmes may be linked to the World Wide Web material.

c. Digital broadcasting has the capacity to deliver multimedia in addition to television programmes.

Ans. to Q No.7 : In the year 2002

Ans. to Q No.8 : Cable television (Cable TV) is a system of providing television and other services to consumers via signals transmitted directly to people's television sets through fixed coaxial cables as opposed to the over-the-air (OTA) method used in traditional terrestrial transmission in which a television antenna is used.

Ans. to Q No.9 : Terrestrial television (also known as over-the-air or OTA) is the traditional method of television broadcast signal delivery. Terrestrial television channels are transmitted via ultra-high frequency (UHF). This signals travel in straight lines rather like rays of light. While, Satellite and cable broadcasting involves the satellite TV channel's earth station, a satellite, multi-system operators (MSOs) and small cable operators (SCOs).

Ans. to Q No.10 : Free-to-air means that the provider does not encrypt the channels and anybody would be able to receive the signal. However, free to view means that the channel provider encrypts the channel but the MSO would have to decode the signal using a card in order to provide the signals to the subscriber. The channel may or may not charge the MSO (who in turn charges the subscriber). Pay channels are those that the subscriber has to pay to watch. For example, Doordarshan is a free-to-air, free-to-view channel. Star Plus, Sun TV etc are pay channels. We need to pay a certain amount to watch a bouquet of channels.

6.8 FURTHER READING

1 Aggarwal, Vir Bala, Gupta, V. S. (2002) Handbook of Journalism and Mass Communication. New Delhi : Concept Publishing Company

2. Kumar, Keval J (2012) Mass Communication in India. Mumbai : Jaico Publishing House

3. Kundra, Shipra (2005) Basic Audio-Visual Media. Anmol Publications Pvt. Ltd.

4. Shrivastava, K.M. (2005) Broadcast Journalism in the 21st Century. New Dawn Press

6.9 POSSIBLE QUESTIONS

Q.1. Explain terrestrial transmission. What is the role of booster in terrestrial transmission?

Q.2. What are the advantages and disadvantages of satellite and cable television?

Q.3. What is a geo-stationary satellite?

Q.4. What is the difference between a free-to-air channel and a pay channel?