

# Communication satellites

A communication satellite is a device that is sent into space, where it revolves around the Earth and is used for radio, television and other electronic communications.

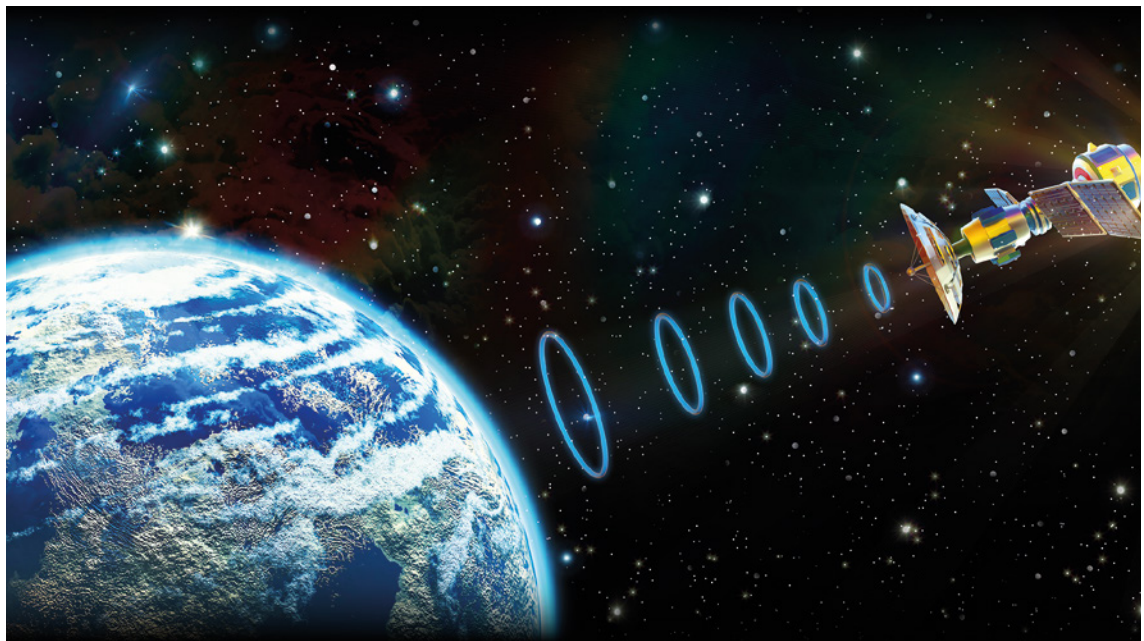
The revolving speed and direction (west to east) of geostationary satellites are exactly the same as that of the Earth, which makes them look stationary from the Earth's surface.

Satellites have completely changed the way we communicate and play a key role in many sectors of society. Today, two out of every three intercontinental calls are transmitted via telecommunication satellites. Moreover, business communications, petrol and water pipelines are often operated by satellites.

But how does a communication satellite work? Weak<sup>1</sup> radio signals, known as the uplink, transmit sound and pictures from a ground station. The uplink is detected by a transponder<sup>2</sup> in the satellite, which boosts the signal and changes its frequency before returning to the Earth – the downlink – where it is received by a satellite dish attached to a receiver that decodes the signal and transforms it into pictures and sound.

A typical satellite has 20 to 30 transponders, each capable of processing 100 million bits of data a second – or a one-million page document in two minutes. Since the satellite is not always in direct sunlight, it needs a supporting power source, recharged by solar panels. Solar panels consist of hundreds of photovoltaic cells, each one made of two layers of silicon. When sunlight hits one layer, it builds up a negative charge; when it hits the other, it builds up a positive charge, causing electrons to flow.

Star-tracking<sup>3</sup> devices and gyroscopes<sup>4</sup> assure ground control and orientation of the satellite at all times. Over time a satellite may drift off<sup>5</sup> its course. This is often caused by high-energy particles from the Sun hitting the solar panels. Small rockets put it back where it should be.



## GLOSSARY

- 1 low
- 2 radio or radar device which receives communication or broadcast signals and transmits them back to the Earth
- 3 following
- 4 wheels that spin inside a frame to keep ships and aircraft constant or to provide a reference direction
- 5 deviate from

## ACTIVITIES

- 1 Answer the following questions.
  - 1 What is the function of a satellite transponder?
  - 2 Where do communication satellites orbit?
  - 3 What is the uplink?
  - 4 What is the function of a satellite dish?
  - 5 How is a satellite recharged?
  - 6 Why do many satellites drift off their course?
- 2 Explain in your own words the meaning of the following terms.
  - 1 Sectors .....
  - 2 Via .....
  - 3 Pictures .....
  - 4 Typical .....
  - 5 Data .....
  - 6 Position .....



3 Read the definitions and label each item in the picture with the correct words.

**Geostationary orbit:** communication satellites and weather satellites are often assigned to different geostationary orbits so that their antennas can be pointed permanently at their fixed position in the sky.

**Solar panels:** they work as a back-up energy source for the satellite.

**Transponder:** it consists of an uplink receiver, which captures the signal, and a downlink transmitter, which sends it back to the Earth.

**Originating ground station:** it transmits sound and picture in the form of radio signals.







4 Label the pictures below with words from the text.



1 .....



2 .....



3 .....



4 .....



5 .....

5 Now provide the definitions of the words in the previous exercise.

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6 Explain how a communication satellite works.