

Satellites

What they are and what they can do

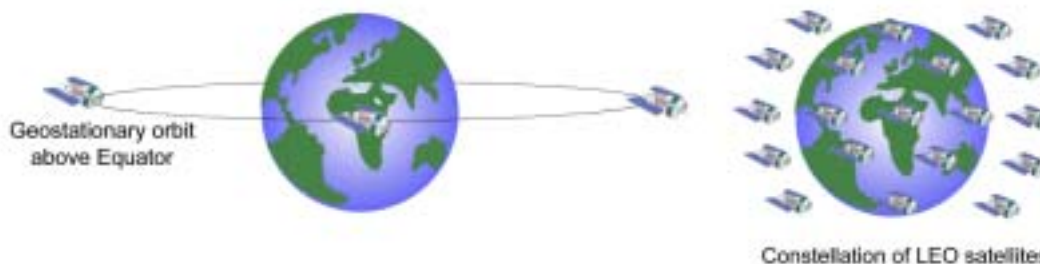
Communications satellites have become a common method of broadcasting TV and radio in Europe, and other parts of the world, over the last 15 years. They have opened up many opportunities for broadcasters to reach new audiences and for viewers to see new programmes. With the advent of digital broadcasting, which squeezes a lot more channels into the frequencies available, broadcasters have started to offer interactive services that use the satellite as part of the access network.

Many large companies also use communications satellites for closed user group broadcasts of, for example, advertising material for use in a chain of department stores. Some supermarkets have also used satellite data services to monitor their sales in real time and support their stock control and logistics planning.

In some ways satellite services are the ideal way of providing broadband services to remote areas because the cost of the service is independent of distance. However, until recently the equipment has been too large and too expensive for the average small business. The situation has changed radically in the last few years as satellite broadcasting has driven down the cost and size of receive-only terminals.

A number of companies now offer hybrid services, which use the satellite to provide a high speed (say up to 1.5Mbit/s) downstream¹ link and a telephone or ISDN line to provide the upstream link. The satellite antenna is typically 60 cm in diameter and the indoor unit is similar in size to a video recorder. Such a service is fine for Internet browsing, where the amount of information received far exceeds the amount sent, but it is less satisfactory for highly interactive applications such as conferencing or collaborative working, where each terminal may need to transmit as fast as it receives.

The cost of terminals that can both transmit and receive satellite signals has also been falling. The antennas are somewhat bigger (typically 70-100 cm diameter) but the indoor unit is not significantly bigger than for a receive-only system. In principle this means that the system can be used for two way broadband communications, although services aimed at small businesses tend to be asymmetric (say 512kbit/s downstream and 150kbit/s upstream).



Geostationary & LEO satellites

Communications satellites are usually geostationary, i.e. they appear to hover above a fixed point on the earth. This has the major advantage that the customer's antenna does not have to track the satellite across the sky and calls do not have to be handed over to another satellite when the first one disappears below the horizon.

The major disadvantage of geostationary satellites is that they have to be around 36,000 km above the earth. This means that the signal received from the satellite is not very strong (and that a transmitter from the ground to the satellite has to provide a strong signal). A further problem is that it takes about a

¹ "Downstream" is used to describe information coming down from the network to your terminal and "upstream" is used to describe information being sent back up to the network from your terminal.

quarter of a second for the signals to travel to the satellite and back to earth. Anybody who has made a phone call via a satellite will be aware of the slightly disconcerting effects of this. This delay is a more serious problem for data communications, because the signalling and transmission schemes expect an almost instant response confirming that the information has been received. If they do not receive this response, they retransmit the information. The link then locks up and continues to retransmit the same message for ever and ever. More sophisticated signalling and transmission schemes, specifically adapted for satellite services, have been designed but they do reduce the data rate that you can actually achieve over a satellite link.

One solution is to use satellites in a much lower orbit of around 1,000 km. The delay is much shorter and, because the signals do not have to be so strong, it is much easier to design antennas for two-way communication. LEO (Low Earth Orbit) satellites can provide users with a high bandwidth in both directions. The main disadvantage is that several satellites are needed to provide continuous service to a given place and a between 50 and 300 are needed for good coverage of the world.

In recent years there have seen several attempts to provide voice and/or data services over LEO satellites. Most have been commercial failures, because their business models underestimated how rapidly GSM services would become widely and (relatively) cheaply available. However, the technology might have been ahead of the market need and may only be starting to become viable. It is quite likely that services based on the use of these satellites will become a more attractive proposition for SMEs in the next few years, especially for those that need mobile communications in remote areas.



*Satellite telephone handset
courtesy of Globalstar*

Advantages and Disadvantages

Geostationary satellites can reach almost all of the remote regions of Europe, as well as the major population centres. The only exceptions are the extreme Arctic regions of Scandinavia and Russia, which can only be served by LEO satellites. Satellites can provide a high bandwidth, if generally asymmetric, connection.

In most cases, a land-based connection is still needed for the return path. This means that satellites are currently best suited to situations where large amounts of information need to be retrieved and only small amounts of information sent. However, two-way satellite services aimed at small businesses are being launched and are likely to become more widely available over the next few years.



*Astra 2B Satellite
Courtesy of BAESYSTEMS*

The quarter of a second or so taken to transmit information to and from a geostationary satellite, which is 36,000 kilometres out in space, may cause problems in applications that require real-time interaction between participants. These problems might be overcome with LEO satellites, but these have yet to prove commercially viable.

Some satellite services provide an 'always-on' connection. If you use such a service, it is vital that you install 'anti-virus' and 'firewall' software on your system. This will screen e-mails for viruses and prevent unauthorised access to your files.

What to buy

If you are based in a very remote region, regularly download large files, or often need to send video clips to your business associates, satellite services could be the solution to your communications problems.

A number of organisations are now offering services which use a satellite for a high speed downstream connection and a conventional phone line for the upstream connection. An example is IPViaSat, which offers business users across Europe a range of IP services, including a high speed Internet access service with downstream speeds of up to 1.5Mbit/s. The

equipment costs between €200 and €300 (plus an installation charge) and service charges are based on the amount of data downloaded (2000Mbyte/s for about €50). You also have to pay for the return channel telephone calls and any charges made by your Internet Service Provider.

BTOpenworld's Business Satellite Service was one of the first two-way satellite services specifically aimed at small businesses in remote areas. Launched in November 2001, it is now available throughout the UK and uses a small two-way satellite dish (65cm x 90cm) to provide an 'always on' Internet access service with downstream speeds of up to 512kbit/s and upstream speeds of up to 150kbit/s. Two packages are available. The cheaper option, which provides service to a single PC, costs £59.99 (~€90) per month. Alternatively, four computers can be connected to the service for £109.99 (~€160) per month. These prices are somewhat higher than equivalent ADSL services and are accompanied by substantial installation charges - £899 (~€1300) for the single-user package and £1299 (~€1900) for the four-user option.

There are now several companies competing to offer satellite based Internet access services in most European countries - the figure is over 20 in the UK. Pricing strategies vary considerably. Some operators offset relatively low installation with higher monthly fees. Others offer an apparently low monthly fee but limit the amount of information you can download. One-way services, which use a conventional phone line for upstream signals, are cheaper than services that use a satellite link in both directions.

National or regional Internet magazines should help you find companies offering services in your area. It is also worth checking the website of Astra, the Luxemburg based satellite operator www.astra.lu. Astra does not directly offer services to the public, but it provides the satellite connections for commercial services in a number of European countries, and the website has links to the suppliers of these services.

Eutelsat, another major European satellite operator, offers a one-way satellite service called OPENSKY through a set of associate partners in individual countries. The website <http://www.eutelsat.net/> provides full details of the service along with links to the associates in each country.

Questions to ask suppliers

You obviously will want to know about equipment costs (buy or rent) and charges for using the service. Beyond this you should ask:

- Will you install and maintain the equipment for me?
- How big is the equipment and what power supply does it need?
- What changes will need to be made to my computer(s) in order to connect to the service?
- Is there a limit on the amount of information I can download per month?
- What downstream and upstream bitrates do you guarantee?
- Can I easily upgrade to a higher speed service?
- How does the reliability of your service compare with that of the telephone service?