

ADSL

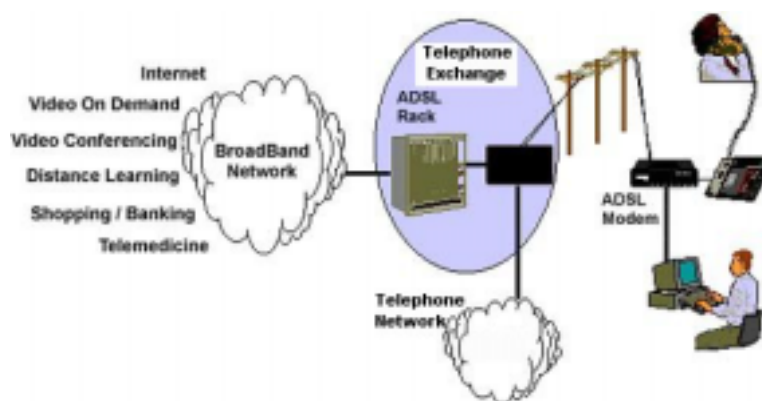
What it is and what it can do

ADSL (Asymmetric Digital Subscriber Loop) is a new modem technology that has been developed over the last 10 years. It can provide a broadband, always-on connection over an ordinary telephone line, on top of the existing telephone service. As the name suggests, it is asymmetric and provides a greater downstream capacity (i.e. towards the customer) than upstream capacity.

The cable linking the Local Exchange or Central Office of the telephone network with the customer's premises is designed to deliver the bandwidth needed for the analogue telephone service. However it can carry signals at much higher frequencies - the problem is that, at these higher frequencies, the signals are severely distorted.

Key messages for SMEs

- ADSL can use your existing telephone line to provide a broadband "always-on" connection to the Internet.
- The service can only be offered to customers located within about 5km of their local telephone exchange
- The bandwidth achievable depends on the length and quality of your existing telephone cable.
- Because the service is always on, you need to install firewall software to protect your system from malicious intruders



ADSL delivers broadband and telephone services over the same cable

ADSL modems carry the broadband signals at high frequencies (between 20kHz and 1.104MHz) and use sophisticated coding and equalisation techniques to overcome the distortion. The broadband signals are split up into a number of narrowband "sub-channels". Different blocks of sub-channels are used for the upstream and downstream signals¹.

To overcome the distortions of the copper pair at high frequencies, the modem monitors the characteristics of the line and

continuously adapts the way the information is sent along the line to optimise performance. By using lots of narrowband sub-channels, and optimising the transmission characteristics of each, ADSL modems can deliver up to about 8Mbit/s downstream² and almost 1Mbit/s upstream. For comparison, this is about 150 times the speed of a normal modem downstream and about 20 times the speed upstream. However the actual bitrate that can be achieved is strongly dependent on the length and quality of the copper cable. In practice this means that customers have to be within about 5 kilometres of their local exchange.

ADSL modems contain a PSTN (Public Switched Telephone Network) splitter, which allows ADSL and telephone signals to be carried on the same copper pair. This is essentially a filter that routes the low frequency PSTN signals to the telephone and the high frequency ADSL signals into the ADSL encoder/decoder.

ADSL is now being actively marketed in most European countries, although it is often only available in larger towns and cities. The services being commercially offered in Europe can provide a bandwidth of up to 6Mbit/s downstream and 512kbit/s upstream, although a maximum downstream speed of 2Mbit/s is more common. The degree of asymmetry being offered in Europe ranges from 10:1 to 2:1 (asymmetry is the ratio between the downstream and upstream speeds).

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.

A 2Mbit/s downstream service will provide Internet access at nearly 40 times the speed of a conventional telephone line and can support good quality video.

As mentioned earlier, the bandwidth that can be offered depends on the distance of the customer from the Local Exchange, and the maximum useful reach of ADSL is a few kilometres. In a typical European country, such as Denmark, it is estimated that 50–60% of customers could be reached by 2Mbit/s ADSL whilst 90–95% could be reached by lower speed ADSL (e.g. 256kbit/s downstream).

Advantages and Disadvantages

ADSL can provide a broadband, always-on connection over an ordinary telephone line, on top of the existing telephone service. It can offer Internet access at up to 40 times the speed of a conventional telephone line and can support good quality video.

Because each ADSL customer has a connection to the Local Exchange over a dedicated copper pair, there is no sharing of access network resources. This means that the bandwidth available to a customer is not affected by the number of other customers using the access network at the same time. However, if all the ADSL customers used their connections simultaneously at full speed, the core networks of the Internet could not cope with the traffic. ADSL users may therefore occasionally experience slow response times when there is congestion on parts of the core network.

The implementation of ADSL can cause practical problems. Because the copper pairs in the cables are being asked to carry much higher bandwidth signals than they were originally designed for, there is a possibility of interference between pairs in the same cable. This will be more difficult to manage once the local loop is unbundled and several operators are using the same cable. Because access networks have grown over many decades, network operators rarely have good records of the electrical characteristics of each pair. Before ADSL can be provided to a customer, tests have to be carried out on his existing connection and some pair re-arrangement may be needed.

The ‘always-on’ connection means that e-mails arrive instantly and that you can access a website without waiting 30 seconds or so to establish a connection to the Internet. But beware! The fact that your computer is permanently connected to the Internet means that hackers can try to interfere with it. They could steal commercially sensitive information or even delete every file on your hard disc. It is vital that, if you use ADSL (or any other permanently-on connection to the Internet), 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

Where available, ADSL can use the existing telephone cables to provide customers with high-speed, always-on, Internet access. It can also deliver good quality video services. However, the speed of the connection depends on the length and the quality of the existing telephone cable. Customers who are more than a few kilometres from their Local Exchange are unlikely to be able to use ADSL services.

Prices, like availability, vary significantly across Europe, ranging from around €25 per month to several hundred € per month. There is sometimes an installation charge of around €100 but, as the market becomes more competitive, many service providers have special offers of cut-price or even free installation. There is not a direct correlation between price and bandwidth, because different providers have adopted different pricing models, but the price generally increases steeply for the higher bandwidth services (i.e. above 2Mbit/s). In the last year or so, some operators have started to offer ‘bargain basement’ ADSL services for as little as €9.99 per month. These are unlikely to be attractive to businesses because they limit the amount of information that you can send and receive over the connection.

To identify potential service providers, look in your local Yellow Pages or one of your national Internet magazines. These magazines will contain advertisements from the larger operators, and may also provide price comparisons and reviews of the services offered. Most service providers have a website, which provides details of their services and tariffs, and allows you to check whether the service is available in your area by typing in your telephone number or postcode.

Questions to ask suppliers

- Is the service available in my area and, if not, when will it be available?
- What speeds can be delivered over my telephone line(s)?

- What is the installation cost and what is the monthly charge?
- 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 modem?
- What is the minimum bitrate guaranteed for the ADSL service?
- Will the ADSL service be as reliable as my existing telephone service?
- Who will own and be responsible for maintaining the modem?
- Is maintenance included in the monthly charge or is it an extra?
- How quickly will you respond to reports of faults?