

Digital Subscriber Lines (DSL)

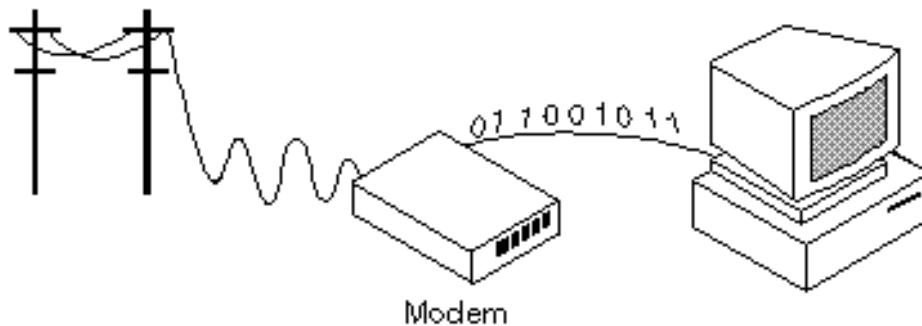


DSL refers collectively to all types of *digital subscriber lines*, the two main categories are **ADSL** and **SDSL**. Two other types of **xDSL** technologies are *High-data-rate DSL (HDSL)* and *Very high DSL (VDSL)*.

ADSL

Short for *asymmetric digital subscriber line (ADSL)*, a new technology that allows more data to be sent over existing copper telephone lines or *plain old telephone service (POTS)*. ADSL supports data rates from 1.5 to 9 Mbps when receiving data (known as the *downstream* rate) and from 16 to 640 Kbps when sending data (known as the *upstream* rate).

ADSL requires a special ADSL modem.



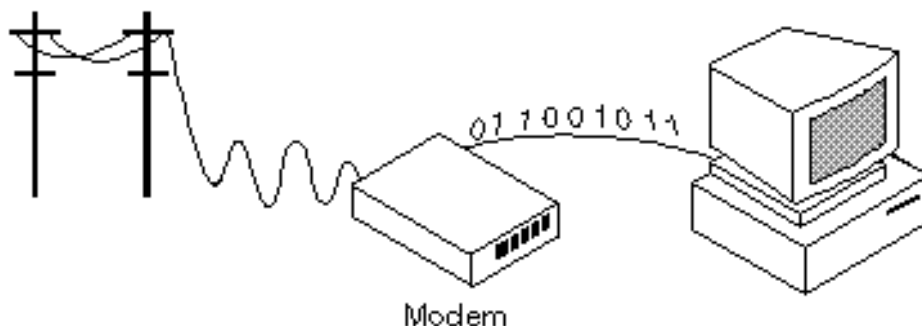
ADSL is growing in popularity as more areas around the world gain access.

SDSL

Short for *symmetric digital subscriber line (SDSL)*, a technology that allows more data to be sent over existing copper telephone lines (POTS). SDSL supports data rates up to *3 megabytes per second (Mbps)*.

SDSL works by sending digital pulses in the high-frequency area of telephone wires and can not operate simultaneously with voice connections over the same wires.

SDSL requires a special SDSL modem. SDSL is called *symmetric* because it supports the same data rates for upstream and downstream traffic. A similar technology that supports different data rates for upstream and downstream data is called asymmetric digital subscriber line (ADSL). ADSL is more popular in North America, whereas SDSL is being developed primarily in Europe.



Digital Subscriber Lines (DSL) (continued)

DSL technologies use sophisticated modulation schemes to pack data onto copper wires. They are sometimes referred to as last-mile technologies because they are used only for connections from a telephone switching station to a home or office, not between switching stations.

xDSL is similar to **ISDN** inasmuch as both operate over existing copper telephone lines (POTS) and both require the short runs to a central telephone office (usually less than 20,000 feet). However, xDSL offers much higher speeds - up to 32 Mbps for upstream traffic, and from 32 Kbps to over 1 Mbps for downstream traffic.

ISDN

Abbreviation of *integrated services digital network (ISDN)*, an international communications standard for sending voice, video, and data over digital telephone lines or normal telephone wires. ISDN supports data transfer rates of 64 Kbps (64,000 bits per second).

Bandwidth

The amount of data that can be transmitted in a fixed amount of time. For digital devices, the bandwidth is usually expressed in bits per second (bps) or bytes per second.