Xdsl Essay, Research Paper

Digital Subscriber Lines

Fast and affordable Internet access has become a big issue for private users and small businesses. Today users have many different options concerning Internet access. One can use a 56k/28k modem, cable modem, wireless, Ethernet, an ISDN connection, a T1 or T3 connection, or a DSL connection. Each method of connection has advantages and disadvantages concerning security, cost, and speed. A newer technology for users is DSL or a Digital Subscriber Line. DSL uses existing phone lines to send info. Unlike a dial up analog modem, a DSL connection allows voice and data to be sent at the same time on the same phone line, the bit rate is faster and the connection is continuous (no need to dial up).

DSL Technology

DSL is a technology for pushing high bit rates through “last mile” telephone connections (small gage copper less that 18,000 ft.). For most people, point A will be their home and point B will be the substation of the local phone company.

DSL modems, unlike conventional modems, establish a connection from one end of a copper wire to the other end of that copper wire: the signal does not pass into the telephone switching system. DSL modems are not limited to using only the voice frequencies passed by the standard telephone system (usually 0-4kHz), DSL modems typically use more than 100kHhz. (Day 1999)

When the local loop carrying the voice/data reaches the local phone company the loop first goes to a splitter which separates the voice from the data. The voice frequencies are sent to the traditional telephone switching network used for voice transfer. The data frequencies are wired into a DSL modem at the central office (CO) end. The resulting high-speed digital data stream coming from (or going to) the consumer is handled as digital data (not analog voice) and may be hooked into a number of networks connection to the data’s destination. The data never enters the standard telephone switching system. (Day 1999)

When you connect to the ISP (Internet Service Provider) you are not connecting to the ISP over its standard modem bank, instead you are coming in over some sort of LAN/WAN (Local/Wide Area Network) data connection that the ISP has arranged with your local phone company. This is the only way an ISP can provide DSL-connected ISP service for customers. Because of the connection to the area network the DSL connection is always on, there is no need to dial up and connect to a modem. (Day 1999)

This is a good graphic network map from dslreports.com

DSL Protocols

There are many different protocols and sub protocols that fall under DSL. Some of the main protocols for DSL are:

-ADSL-Asymmetric Digital Subscriber Line (1.5 Mbps-9Mbps) (DNAI 1999)

-RADSL-Rate Adaptive Digital Subscriber Line (test and adapts for fastest speed) (DNAI 1999)

-HDSL-High bit-rate Digital Subscriber Line (T1 Speeds, currently requires 2 lines) (DNAI 1999)

-VDSL-Very-high-bit-rate Digital Subscriber Line (ten times as fast as ADSL, not on market yet) (Clarke 1999)

DSL networks have modems at both ends of the connection, the customer?s modem and the ISP’s modem. Because different protocols use different hardware (modem) the ISP chooses what protocol will be used.

Hardware

Although it depends on your ISP and the equipment they use, typically you will need a 10Base-T adapter with which to connect to the external DSL modem, and a personal computer. Keep in mind that with different protocols you will need different DSL modems. If you are putting together a LAN you will also need a hub or preferably a switch. Usually the customer DSL device is implemented as a bridge, router or both. (Kristoff 1999)

Splitters and Filters

Because the same line is used to send voice and data frequencies it is possible for interference to occur. Sometimes a phone will go above the 4kHZ frequency and cause interference with the DSL data stream. Another problem is the high frequencies used by the DSL modem can be picked up by the phone resulting in static on the headset.

The original solution to 4kHZ interference problems was to use a POTS “splitter”. A splitter takes the phone line and forks it. One line goes to the telephones and the other goes to the DSL modem. Besides splitting the line the splitter acts as a low-pass filter allowing only 0-4kHZ frequencies to pass to the phone thus eliminating interference. (Day 1999)

(Image from Day 1999)

Another solution to the interference problem is to install a micro-filtering device between the telephone/ telephone system and the wall jack. The DSL modem does not require a filter.

(Info from Day 1999, image from dslreports.com)

Security

A DSL Internet connection has a greater security risk than a regular dialup analog modem connection. For one, the bandwidth is greater, which allows the possibility of more cracking to be done in the same period of time. More importantly, the connection is usually always on, which makes the host computer a much easier target to find. (Day 1999)

Different LAN configurations (i.e. selecting a different IP address for each computer), software, and firewalls can be used to make a DSL connection more secure. (Ullrich 1999)

The image above is an example of a dual-homed gateway between the ISP and the local LAN. By using this configuration the LAN traffic is isolated from the ISP, thus creating a more secure connection for the computers in the LAN. The recommended operating system for this configuration is Windows NT because of its advanced security capabilities. (Image and info from Day 1999)

Speed

The speed of you internet connection depends on many different factors: what gage of wire is used to connect, how far the computer is from the local CO, the DSL service subscribed to, the numbers and configuration of the LAN, the hardware and protocol the ISP uses, etc. Under ideal conditions it is claimed that connection speeds can be up to 50 times the rate of a traditional analog 28.8k modem. Currently VDSL technology is being developed which is supposed to be 10 times as fast as ADSL (which operates at 1.5 Mbps-9Mbps). This technology is said to be available sometime in 2001. (VNI 1999)(Clarke 1999)

Local Availability and Cost

According to dslreports.com Menomonie does have access to DSL service through Wisconsin Bell Inc. My house is 1937ft from the local CO, which means that Internet speed would be almost as fast as possible. I could not find any prices for this area but the price for a DSL connection runs anywhere from $50 to $80 per month depending on which speed you choose and how many computers are connected. Start up fees and service agreements also apply.

The Future of DSL

The future will probably see the elimination of the POTS, particularly in the local loop. The high-speed line into the home will be capable of carrying both data and voice. One example of this is the Sprint ION plan.

The Sprint ION plan gives you unlimited local and long distance telephone service through VoDSL, and a high speed Internet connection (up to 8mbit down, 1 mbit up, depending on line quality). The service is currently offered only in Seattle, Denver, and Kansas City and costs $160 per month. At this price it would be cheaper for most people to run one DSL and pay for telephone service separately, however, if you make a lot of long distance calls this service may be a good deal. (Day 1999)

The growth in subscribers has been pretty impressive in the past year. The following graphs from xDSL.com show the past and current growth as well as projections for the future.

Projection

If these trends continue to grow as they have and the projections are accurate then now would be a great time to invest in DSL technology and service.