Computer Briefs

POTS and Other Channels

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Are you spending a lot of time waiting for web pages to download? There may be a solution. A faster computer will not help, but such things as ISDN, DSL, aDSL, sDSL, cable modem, or satellite link might help.

PLAIN OLD TELEPHONE SYSTEM (POTS)

As I explained in my last column (J Med Pract Man age ment, 2001;16:2;108–109), the problem is the speed of the communications channel, i.e., how fast digital data can be sent through a normal analog telephone line. In our modern telephone infrastructure, the only place where a normal analog telephone [plain old telephone system (POTS)] line exists is between the central office and the house or office. This link is known as "the last mile," and the technology that makes it work has gone largely unchanged for well over 70 years. It is your private connection to the telephone infrastructure.

Voice communication is handled between modern central offices as if it were high-speed digital data. It makes economic sense, and there is often fierce competition to build new infrastructure between central office facilities in order to handle high-speed data. But the installation of new cables, either copper or fiber optic, between the central facility and the home or office location, is generally not economically feasible. Therefore, the sought-after solution is to use your telephone line to carry the high-speed data. This infrastructure was never designed to carry such data. Therefore, special coding schemes and innovative transmission methods have been developed to allow the existing "last mile" infrastructure to do what it was never designed to do.

The theoretical maximum of today's voice telephone system is the equivalent of 5,600 characters per second (cps). In reality, the rate is closer to 4,800 cps. We will need this speed to compare some of the communications solutions that are becoming available. Therefore, to keep it as simple as possible, let's assume that a POTS line has a maximum digital transmission rate of 5,000 cps.

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

The first solution to the "last mile" problem was called ISDN (Integrated Services Digital Network). It is well known that more data can flow through a communications channel if the data are in digital format rather than in analog format. Traditionally, a modem is used to convert

the computer's digital signal to an analog signal to make it compatible with the analog telephone line. With ISDN, the telephone line is converted to a digital telephone line. The computer's digital signal is left alone, and instead, the voice signal is converted into digital form by the telephone. As a result, the telephone line can handle a normal voice telephone simultaneously with up to 11,200 cps, a little more that two times faster than the POTS line.

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The scheme worked well where it was made available, but it was expensive. It required a non-trivial installation in the home or office by the telephone company. This installation often cost $300 to $500 and often required the customer to buy the equipment that was being installed at an additional several hundred dollars. A good online reference for ISDN information can be found at www.isdnzone.com.

DIGITAL SUBSCRIBER LINE (DSL)

Within the last two years, the communications industry has come-up with another communications scheme called DSL (Digital Subscriber Line) to overcome the "last mile." DSL makes use of the fact that high-speed digital data are transmitted at a much higher frequency than analog voice data. So both analog voice data and digital computer data can travel across the same wire at the same time. The box needed to make this miracle happen costs about $100 and can usually be installed at home or in the office by the user. A good online reference for DSL information can be found at www.dslreports.com.

DSL sounds like the perfect solution, but not quite. It turns out that the faster that digital data are transmitted, the shorter the distance though a wire that the data will flow. A communications engineer with tell you that DSL is "distance sensitive." The general rule is that the wire length between the site to be served by DSL and the serving central office cannot exceed 15,000 feet (approximately 2.8 miles). Notice that it is not the distance as measured by a straight line, or even the driving distance, but rather the length of the wire connecting the two locations. There is no way to know this length except by calling your telephone company. Given the age of a large part of the "last mile" infrastructure, very often even your telephone company doesn't know for sure.

SUBSCRIBER BEWARE

When you call the telephone company business office, they will ask for your 3-digit telephone exchange and your address. They need the telephone exchange to determine if your servicing central office is equipped to handle DSL service. They need your address to guess the wire length to the central office. If you are told that DSL service is available to your location, ask at what speed the service will be. You will probably get a range and a statement that until the equipment is installed and tested, they really cannot guarantee the minimum speed suggested.

This is because the speed is dependent on the length of the wire between the central office and your location and they are only able to guess the length.

Compare pricing, installation fees, contract length, and transmission speeds before you make a decision.

If the telephone company business office tells you that DSL service is not available to your location or if you think that the suggested speed is too slow for your needs, there is still hope.

Look in your local yellow pages under the heading "Telecommunications Companies" for other companies that provide DSL service to your area. Very often these companies, some of which are local independents and some of which are associated with well-known long distance carriers, can provide DSL service to your location. Compare pricing, installation fees, contract length, and transmission speeds before you make a decision. Try to find someone who is using the service provided by your chosen vendor and compare notes. DSL service is new enough so that many of the smaller service providers are either going out of business or being acquired by larger companies, so pay as little as you can in advance and try to deal only with well-known companies with long-term histories.

GREAT, WHEN IT WORKS!

Although DSL service usually works, the word "usually" often translates to 95% to 97% of the time. That means that DSL service doesn't work, on average, as often as one day each month. So don't throw away your old modem, and don't become dependent on the high speeds. In fact, several DSL suppliers include a certain number of minutes for a modem connection through either a local or toll-free telephone number so you can stay connected while the DSL connection is not working.

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How fast is DSL? That answer is complicated by factors beyond wire length. For now, let's say that DSL is between 4 and 25 times faster than a POTS line. More about this and other "last mile" solutions next time. n

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