

STATE OF THE ART; The Year Of Big Bandwidth

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WHEN my local cable television operator, Time Warner, told me that after several months of waiting, I was next on the list to get a cable modem, I was practically giddy with anticipation.

A cable modem is related to a regular computer modem the way the movie "Speed" is related to "Driving Miss Daisy." Using the local cable television network instead of the local phone network to connect to the Internet's main arteries, a cable modem hauls tons of data at high speeds -- theoretically up to more than 25 megabits per second (25 million bits per second, or 25 mbps), but in practical terms, 500 kilobits per second (500,000 bits per second, or 500 kbps) to 2.5 mbps.

A cable modem has high bandwidth, an industry term that means it carries a lot of information per second. It is also often called a fat pipe, based on the idea that information is like water and comes into your computer in a rush or a trickle.

Only a relatively small number of home computer users are now eligible to sign up for the high-bandwidth Internet services being offered by cable television companies (cable modems) and phone companies (digital subscriber lines, or D.S.L.). But in the coming year, as these industries battle to sell high-speed data services to consumers, potentially millions of people and small businesses will have the opportunity to wallow in the kind of bandwidth that once was affordable only for corporations and universities.

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Just a short while ago, I was a low-bandwidth kind of guy. I had one of the fastest telephone-based modems you can buy in my home office, with a theoretical top speed of 56 kbps. Most people who connect to the Internet from home do so at speeds ranging from 14.4 kbps to 33.6 kbps. So a cable modem held the promise of increasing my bandwidth at least tenfold, and, downhill with a tail wind and no other traffic, perhaps as much as fiftyfold. But there are some speed bumps, which will be discussed below.

Most consumers use dial-up modems, which are called that because the user has to dial up a phone connection between the home computer and the Internet service provider before going on line. Cruising the World Wide Web with a dial-up modem is like reading a magazine in slow motion, turning a page once every 20 seconds or so. No wonder some people call it the World Wide Wait.

Corporate Internet users and students in dormitories often connect to the Internet over so-called broad-band networks, which are high-capacity pipes shared by users on that line. For years, phone companies have sold big-bandwidth Internet pipelines for hefty fees, usually \$1,000 a month or more. A T-1 telephone line, for example, has a bandwidth of 1.5 mbps. Turning a Web page or downloading a picture from a Usenet newsgroup on a T-1 link often takes only a second or two.

With a cable modem or one of the new D.S.L. modems that phone companies are just starting to offer, consumers can get some of the benefits of a T-1 line for \$40 to \$60 a month.

Now, \$40 to \$60 a month is still a lot of money, especially if you are also paying the cable company for television service. My monthly cable bill went to \$79 a month from \$34 overnight. Plus, there was a one-time installation fee of \$89. And PC users have to buy (for \$50 or more) an Ethernet card, also known as a Network Interface Card, or N.I.C. (These are standard on most Macintoshes.)

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And there was the aggravation of dealing with the cable company, which, despite the cable industry's efforts to improve its image for customer support, still managed to amaze me with its incompetence.

It took several visits, spread over two weeks, by a total of five Cable Guys before my Macintosh G3 was finally wired into the cable network and working properly. Even so, it was worth it. I love my cable modem.

The Internet is always "on" at my house, at least as long as my computer has power. That persistent connection has psychological as well as practical effects. I doubt that people would watch as much television if they had to boot up the set, wait a couple of minutes for it to "handshake" with the network and then wait 20 seconds each time they wanted to change a channel.

Now my phone company tells me I'm also near the top of the list to get a D.S.L. modem. Like a cable modem, a D.S.L. modem promises consumers a large increase in Internet bandwidth for monthly prices ranging from \$40 to \$60.

Both cable and D.S.L. modems have advantages and disadvantages. For many people, the relative differences are moot because, for now at least, most consumers do not have a choice.

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Cable companies and phone companies are racing to upgrade equipment in more affluent neighborhoods (the ones with the highest percentage of computer users) to make high-speed services possible. It will take years before most homes have access to these services. Meanwhile, Net users hungry for bandwidth will take what they can get.

Cable already serves most areas in the United States, but not all cable lines can carry high-speed data. While almost all homes are wired for telephone service, it takes special equipment at the local switching station to support D.S.L. service, and only a few hundred of the thousands of switching stations nationwide have it.

D.S.L. is, to a greater extent than cable, fragmented by different and incompatible standards. Also to a greater extent than cable, D.S.L. is limited by distance. People who live more than about three miles from a local switching station cannot get D.S.L. service.

While cable modems offer higher theoretical top speeds than D.S.L. modems, D.S.L. modems offer higher guaranteed speeds. On my cable system, my bandwidth depends on how many people are using the same local loop at the same time. If all my neighbors sign up for cable Internet service and log on at the same time, my bandwidth could slow to a crawl -- scarcely better than the dial-up modem I replaced. Because I was one of the first kids on my block to have a cable modem, however, I'm cruising at megabit speeds most of the time.

(Of course, with any type of modem, one rarely achieves the maximum speed; any Internet connection is limited by its slowest link.)

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D.S.L. comes in a bewildering variety of speed and price offerings. In my area of the country, the \$49 monthly consumer plan guarantees me Internet access at asymmetric speeds of 384 kbps when I am downloading something from the Internet and a minimum of 128 kbps when I am sending information upstream. (Because the upstream and downstream speeds are asymmetric, this kind of D.S.L. service is called A.D.S.L.) While 384 kbps is the guaranteed downstream minimum, the phone company says I can expect gusts up to 1.5 mbps.

Cable, then, offers higher highs and lower lows for about the same price as A.D.S.L.

My local A.D.S.L. service gives me a choice of Internet service providers. I can buy the basic pipe for \$39 a month, then pay a separate fee to my current I.S.P. to keep my current E-mail address and Web page, if my I.S.P. supports my kind of A.D.S.L. Or, for an extra \$10 a month, I can use the phone company as my I.S.P.

With cable, I have no choice. Time Warner provides me with its Roadrunner service whether I want it or not. It is as if I signed up for local telephone service and was told that I could choose any long distance carrier as long as it was AT&T.

As more people get fat pipes, the fights will become fierce over what comes over those pipes and how. We can expect fierce regulatory battles in the coming year as different companies try to get the cable companies to open their pipes to different voice, data, video and audio services.