

# EXPLORING BROADBAND

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## ABSTRACT

*Broadband is one of the fastest growing industries in the United States economy. There are many aspects of broadband that one must consider before making the decision to switch over to it from a traditional dial-up Internet connection. Many people have several types of broadband connections to choose from and others are left out of the broadband loop all together. The availability of broadband depends on where one lives or works. The broadband industry has been going through some major changes in the past few months, so it might be a good idea to do some research before choosing a broadband provider. One should also look at pending legislation in Congress to see what effect it might have on future broadband connectivity. Finally, there are numerous ways you can protect yourself from the turmoil currently affecting many broadband providers.*

**Keywords:** Internet Security, Crackers, Hackers, Viruses, Anti - virus programs, Spyware, Firewall

## INTRODUCTION

In today's world greater speed is an all-consuming desire. This desire for speed affects many aspects of life, such as buying faster cars, making money more rapidly, climbing the ladder in the business world more swiftly, and, most importantly, faster Internet connections. Now there is a way for people to get their faster connections: broadband. Broadband technology is the always-open gateway to a new world of Internet services delivered at lightening- fast speed to homes, offices, and businesses (2). Throughout this paper many facets of broadband will be discussed, including its history, how it works, types, and current legislation in Congress.

## HISTORY & AN EXPLANATION

Since the 1950s, broadband technologies, such as fiber optics have existed; however, their regulatory and financial constraints meant that their use was kept behind the scenes in the telecommunications world. Then the first deregulation of the telephone industry in 1984 ushered in the widespread use of fiber-optic technology. In the 1990s, demand for high-speed data, voice, and video was stimulated by the rise of the Internet. Broadband transmission services were forced into consumer homes and businesses when the Telecommunications Act of 1996 was passed (10). The goal of this act is to let anyone enter any communication business, to let any communications business compete in any market against any other (14).

The cable industry was the first to introduce interactive services around 1998, and by the end of 1999, about 1.5 million people had subscribed to cable-modems. About the same time as cable- modems were gaining popularity, so were digital subscriber lines (DSL). The

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telecommunication companies had possessed this technology since the late 1980s, but it had not been offered to the public for fear of damaging their other businesses. Once the technology was launched, the companies pushed it aggressively and the number of subscribers increased at an extremely rapid pace (10).

The broadband concept is, in part powered by digital and fiber-optic technologies. Vast amounts of data, voice, and video information are compressed by digital applications and are broken down into “bits.” Broadband pipelines can carry a lot more bits than regular telephone or wireless connections. The difference between broadband and dial-up service (“narrowband”) is often thought of as the difference between a fire hose and a garden hose (2).

### **TYPES OF BROADBAND**

The broadband industry offers several different types of connections for people looking to get the service. The four main types are: DSL, cable, satellite, and fixed-point wireless.

#### **Digital Subscriber Line (DSL)**

DSL transforms plain old telephone service (POTS) lines that carry voice traffic to and from your telephone into powerful carriers of high-speed digital data. Filters at the end of the lines separate voice signals from data signals. The PC’s are usually connected to the DSL network by means of a router placed beside the computer. DSL is widely available in urban and suburban areas, and the availability is growing quickly (12). During the past year, the process for getting broadband has been simplified, particularly for DSL connection. Installation times have dropped from an average of 30 to 45 days to 5 to 15 days. Industry analysts have found that more than 90% of the DSL connections are now self-installed by the customers (12). Although the process has been made easier, that does not mean that DSL installations are always easy and painless; they can still encounter many problems and end badly. Several parties are still involved in coordinating a provision: the phone company, a DSL provider, and an ISP. Each of these factions has to uphold their deadlines, send out people at the correct times, or dispatch equipment just to make it all work properly. Another problem that can occur during installation is bad copper telephone wires. The copper wiring used for the telephone systems varies in quality and condition from neighborhood to neighborhood, and sometimes from building to building. Testing the condition of the telephone lines can add more time to the installation (12). People looking to obtain DSL can expect to pay anywhere from zero to \$200 for installation (if, that is, they can find a company who offers an installation package), \$75 to \$200 for equipment, and \$50 to \$125 for activation. Monthly fees for DSL vary from \$45 to \$55 (2).

An advantage to the DSL network is that POTS lines are generally widely distributed. This means that customers may have a choice of DSL services providers, with a variety of packages available, including a choice of both speed and price. The bandwidth associated with DSL tends to vary less than with a cable service. Although the fact that POTS lines are readily available in most areas is an advantage, a drawback to DSL is that since the lines were not run with it in mind the reliability could be less than optimum. Another disadvantage of DSL is the difficulty of installation, service, and troubleshooting due to the fact that DSL providers lease service lines from the line owners (12).

#### **Cable**

Cable television lines provide the medium of exchange for the cable data signals. Modems, which are present at the home or business using the cable, determine the data signals from the television signals (12). The industry average for turning on a cable modem is two to

five days, much faster than DSL service. People who decide on using a cable service have a much better chance that cable service is available in their area. It was estimated that at the end of 2001, 66 percent of the U.S. population would have access to a cable service. The service provided by for cable is relatively reliable. The cable industry has also installed a new cable infrastructure, hybrid fiber coaxial, that is a much more predictable, known quantity than the old copper telephone lines (12). When subscribing to a cable service, remember to ask about self-installation—this process could possibly cut installation fees in half. Also, buy your own cablemodem; they cost around \$200, but renting one from the company could cost about ten dollars a month and push service fees up ten to fifteen dollars (4).

One disadvantage to cable is that the cable providers are often local monopolies that, for the customer, translate to very little choice in programming. Another disadvantage to cable is that the bandwidth is shared with other customers of that cable provider. Shared bandwidth means that the more people signed on to the local loop, the less throughput is available for your use (12).

### **Satellite**

In the satellite system, signals travel from the satellite network operations center (NOC) to a satellite, which, in turn, broadcasts the signal. Uploads are either transmitted via the same method or through a dial-up connection in older systems. Satellite is widely available, provided that the customer has a line of sight to the southern sky. This extensive coverage is a definite advantage because for many rural households and businesses, satellite may be the only broadband option for years (12).

As it stands now, that coverage may be the only advantage. When looking at surveys done on satellite subscribers and an analysis of the satellite systems themselves, one sees mostly dissatisfied, frustrated customers. The installation of satellite service can take up to an entire month, although this may be because of Federal Communications Commission (FCC) regulations that state the installation must be done by a professional (4). Installation cost is \$199, the price for equipment ranges from \$399 to \$549, about five dollars a month for service charges, and a \$70 monthly fee (2). Many customers of satellite broadband companies are surprised when they exceed their download limit per session (for DirecWay customers that limit is 165MB per session) and are required to use their dial-up connection until they log off and then on again in order to begin a new session. Also, the quality of the installers astonishes many customers; like DSL and cable, installation is generally outsourced, but the installers the satellite companies use seem unqualified overall. Ken Knight, a StarBand subscriber interviewed in a PC Magazine article said, “the guy [installer] didn’t know anything about computers. He handed me a USB connection and said, ‘here, I don’t know where this goes.’ The installation took about 24 hours, because the first time he was at my house, he forgot the software and cabling” (1). Knight, after he got his connection up and running, was satisfied with the service, but was aggravated with the speed (he was averaging only about 40K to 50K). The article concluded “satellite is worth considering for broadband only if no alternatives are available at your location” (1).

### **Fixed-Point Wireless**

In the fixed-point wireless system the NOC beams signals directly to dish receivers that are in the line of sight, or to a repeater tower that relays the signal. Entire neighborhoods that are connected may use microcell repeaters to propagate the signal. Fixed-point wireless is not broadly available because a customer must be within the line of sight of a tower or a repeater. A subscriber of a fixed-point wireless company may have to pay, on average, about ten dollars more per month than cable or DSL subscribers (12). An advantage is that it may be available in areas with no other broadband coverage and it also competes with satellite. Like the satellite, fixed-point wireless speeds are not high, signals can be unreliable, especially in bad weather, and cost may be too high for the average home-user. It requires the purchase and installation of a receiver and is available only on a neighborhood-by-neighborhood basis (12). Fixed-point wireless customers, like cable Internet users, must share bandwidth (airwaves, in this case). Thus, the more people online, the slower the connection will be. But don't be discouraged; given that at the present time there are only about 100,000 to 125,000 fixed wireless subscribers, there is ample bandwidth for everyone (4). Many carriers of the fixed-point wireless service invested deeply in Multichannel Multipoint Distribution Service (MMDS), a wireless data technology that operates in the 2.5- to 2.7-GHz band and can transmit data at multiple megabits per second at distances of up to 35 miles. These companies have now decided, after sinking hundreds of millions of dollars into MMDS, that the service is not economically viable because of the cost associated with it. As a result, several companies are phasing out or halting expansion of their wireless services (12).

## **BROADBAND INDUSTRY**

The broadband industry encompasses the companies that offer DSL, cable, satellite, and fixed-point wireless services. An ISP News article by Roy Mark reports that the online access market showed a paltry increase of only one percent, up to 69.3 million in 2001 from 68.6 million in 2000. However, the report did find that the number of users signing up for cable modem service increased to 6.6 million during 2001 up from 4.2 million in 2000, a more than 58 percent increase. Also increasing in 2001 was the number of DSL subscribers, a 68 percent increase (6).

This growth in the cable and DSL services comes at the expense of the traditional dial-up services with ISP's seeing their first year-over-year decline in number of users. However, paid dial-up ISPs did show a growth of 18 percent over 2001. While they remain the most popular means of access to the Internet, their growth has slowed dramatically, with only a two percent increase for the fourth quarter (6).

Even though the cable and DSL markets have shown considerable growth over the past year, they have not done so without problems. One such problem is Excite@Home's recent bankruptcy. The company provided cable modem access to 4.1 million subscribers and ranked as one of the world's largest ISPs. The \$6.7 billion merger of @Home and Excite might have been the reason for the company's collapse, when the synergy envisioned between content and connections by executives during the 1999 merger didn't pan out (12). Another problem that occurred during 2001 was when NorthPoint Communications and Rhythms NetConnections went out of business. This cut off many DSL users and caused them to become wary of DSL. Also in 2001 many major DSL providers raised their already high prices to even loftier heights (4).

The recent expansion of the broadband market has led to several major business mergers. Early in 2001 AOL, Microsoft's biggest competitor, and Time Warner, the country's largest provider of cable and broadband services, completed their merger. Then, just a few months ago, AT&T sold its huge cable business to Comcast. The results being that the Comcast/AT&T merger will make it the largest cable company, with 22 million subscribers followed by AOL Time Warner, with 13 million. Another major business combination occurred when EchoStar Communications, the country's second largest satellite company, bought DirecTV, which makes EchoStar Communications the dominant satellite provider, with approximately 17 million customers (7,8).

In Washington, D.C. recently, the tech companies have been attempting to get Congress to boost broadband. The reason for this is clear: it benefits their struggling industry. Broadband's advocates emphasize the high-speed benefits; they estimate that broadband access is worth billions to consumers: in flexible works schedules and fewer traffic jams (11).

### **TAUZIN-DINGELL BILL**

The Internet Freedom and Broadband Deployment Act (H.R. 1542), also known as the Tauzin-Dingell bill for its sponsors Billy Tauzin and John Dingell, seeks to ease government regulation of the regional operating Bell companies. Tauzin-Dingell includes several key provisions: allowing Bell telephone companies to provide high-speed data services on a nationwide basis; banning FCC or state regulation of the rates, conditions for, or entry into highspeed Internet service; and limiting requirements that the Bell companies and other incumbent telephone companies (local exchange carriers, or LECs) provide competitors with access to network elements used for high-speed data (5). Critics of the Tauzin- Dingell bill say it lets the Bells escape competitive and regulatory pressures imposed by the Telecommunications Act of 1996, which took ten years to develop. The bill lifts restrictions the Bells have chafed under for five years. Tauzin maintains that the regulations were patently unfair because they did not apply to the Bells' chief broadband rivals: the cable companies. Proponents on both sides of the bill insist that nothing less is at stake than the availability of broadband, the information technology industry, and perhaps even the future of the economy (9).

Before an 11<sup>th</sup> hour amendment was added it did not look as though the bill would pass in the House of Representatives, but when it was put up for vote on February 27, 2002 it passed. The amendment supposedly guarantees competitive access to all fiber and copper wire on the Bell's network, though it hides wording that restricts competitive access to remote terminals. Remote terminals are the linchpins to any rural or underserved broadband operation. They extend the physical limitations of DSL technology beyond the 15,000 feet reach of central offices (6).

The Bells are touting this bill as a way for them to expand their data network, which will help revive the nation's lagging economy. Yet, not all Bell customers are excited about the prospect of releasing the incumbent carriers from competitive obligations. Some are worried that if the Bell companies can set the rates for other providers then they can make it impossible for competitors to make a profit. Others worry that once the Bells are released from their competitive obligations they may not make the expansive broadband investments they have told

lawmakers they plan to make. The customers cannot help but remember that the current carriers had the DSL technology for over a decade but did not put it into action until after the Telecommunications Act of 1996 spurred many other DSL carriers into the business (3). Jim Geiger, CEO of Cbeyond Communications, said. "This bill, if passed, will bring the delivery of competitive local phone service to a screeching halt, ultimately raise the cost of local telephone service, and further slow down the delivery of broadband access to these businesses. And that would be sad indeed" (15).

## **PROTECT YOURSELF**

In these times, "change is the only constant, especially when talking about broadband Internet access" (13). Thousands of broadband subscribers have been negatively affected by the recent upheavals in the broadband industry, i.e. Excite@Home's shutdown, Comcast's purchase of AT&T Broadband. These cases could incite additional cable and ISP consolidation. With fewer providers around, the ISPs won't have to worry as much about their rivals.

There are several ideas you can use to protect yourself from future chaos. You should get a backup Internet access account, either prepaid or through a second service. Pre-paid Internet access acts like phone cards, for example Sprint sells a ten-dollar card that gives users 8 hours of Internet time. Use a second provider to gain a backup e-mail address, such as Yahoo or Hotmail. Mergers in the broadband industry could lead to customers having to change their e-mail addresses, like in the AT&T/Comcast case, so it would not hurt to take some preventative action. You should evaluate other companies for price breaks. Many subscribers will likely find cheaper rates from a competing ISP selling service on the same network. Finally, don't throw your records away. If you have a feeling that only bad things are coming for your ISP, be sure you keep complete billing records in case you need to ask for a refund (13).

## **CONCLUSIONS**

By the end of 2002, it is estimated that 80 percent of U.S. consumers will be able to order at least one form of wire- line broadband service. However the same report found that only 15.4 million households will actually have broadband access of some kind—about one-third of the families who currently own PCs (12). This shows that cost will still be a prohibiting factor in deciding to go with broadband. Admittedly, the speed of broadband is compelling and nearly every article written about broadband insists that once you've gone broadband you'll never be able to go back to dial- up. But not everyone will have the chance to experience these speeds. The cost and availability of broadband services will have to undergo sweeping changes to achieve the saturation that the industry would like to see in the communication market.

## **REFERENCES**

1. Bannan, Karen J. (2002, February). Satellite: The Only Game Out of Town. PC Magazine, 99.
2. Broadband FAQ. (n.d.). Retrieved February 25, 2002, from [http://www.broadbandcompass.com/search/jsp/faqs/faq\\_broadband.jsp?partnerID=microsoft](http://www.broadbandcompass.com/search/jsp/faqs/faq_broadband.jsp?partnerID=microsoft)

3. Carlson, Caron. (2002). House Passes Tauzin/Dingell Bill. Retrieved March 1, 2002, from <http://www.pcmag.com/article/0,2997,s=1582&a=23404,00.asp>
4. Grimes, Brad. (2002, February). Ditch Your Dial-Up. PC World. 68-76.
5. Mark, Roy. (2002). Broadband Connections Show Considerable Growth. Retrieved March 1, 2002, from [http://www.internetnews.com/isp-news/article/0,,8\\_981831,00.html](http://www.internetnews.com/isp-news/article/0,,8_981831,00.html)
6. Mark, Roy. (2002). Tauzin-Dingell Set for Vote. Retrieved February 28, 2002, from [http://dc.internet.com/news/article/0,1934,2101\\_981851,00.html](http://dc.internet.com/news/article/0,1934,2101_981851,00.html)
7. Miller, Michael J. (2002, February). Broadband Optimism. PC Magazine. 7.
8. Miller, Michael J. (2002, February). Can You Say Oligopoly? PC Magazine. 7-8.
9. O'Connor, Rory J. (2001). Tauzin Delivers Bill for Bells. Retrieved March 2, 2002, from <http://www.eweek.com/article/0,3658,s=722&a=3619,00.asp>
10. Palazzo, Anthony. (2000). History of the Broadband Industry. Retrieved February 25, 2002, from [www.broadband-internet.org/history.htm](http://www.broadband-internet.org/history.htm)
11. Roy, Saumya. (2002). Broadband: On the Fast Track? Retrieved February 26, 2002, from <http://www.pcworld.com/news/article/0,aid,85644,00.asp>
12. Spangler, Todd. (2002, February). Crossing The Broadband Divide. PC Magazine, 92-103.
13. Spring, Tom. (2002, March). Ease Broadband Jitters. PC World. 28.
14. Telecommunications Act of 1996. (2001). Retrieved March 2, 2002, from <http://www.fcc.gov/telecom.html>
15. Wagner, Jim. (2002). Last-Minute Wranglings on Tauzin- Dingell. Retrieved February 28, 2002, from [http://www.internetnews.com/isp-news/article/0,,8\\_981151,00.html](http://www.internetnews.com/isp-news/article/0,,8_981151,00.html)