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A Free-Market Guide to Navigating Tech Issues in the 107th Congress

High-Speed Internet Access Policy

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HIGH-SPEED INTERNET ACCESS POLICY

No technology has ever been adopted as rapidly as the Internet, which now reaches half of all US homes.[1] And the next revolution is already underway, as residential Internet users switch to the high-speed, always-on connections called "broadband."[2]

Deployment of residential broadband is, according to the Federal Communications Commission, proceeding satisfactorily.[3] But there is a threat to this progress: Inefficiencies imposed by the government in an effort to fine tune broadband deployment or protect particular interests could slow or even halt the process.

SPEEDS: A "bit" is the fundamental unit of binary information—a 0 or a 1. The speed of communications devices is measured in bits per second.
The basic abbreviations are:
Thousand bits per second: Kilobits (Kbps)
Million bits per second: Megabits (Mbps)
Billion bits per second: Gigabits (Gbps)
Trillion bits per second: Terabits (Tbps)
Quadrillion bits per second: Petabits (Pbps)
Quintillion bits per second: Exabits (Ebps)
On your computer, file sizes are shown in "bytes." A byte is 8 bits, which is the amount of information necessary to constitute a single letter in binary code. Thus, a 56-kilo*byte* file is 448 kilo*bits*, and would take 13.6 seconds to transmit at the standard modem speed of 33 Kbps.

Technologies. A consumer gets basic Internet access by dialing up an Internet Service Provider (ISP) over a conventional telephone line. The ISP then connects the user to the Internet "backbone" and "middle mile," a network of almost 19 million miles of fiber-optic cable (usually called just "fiber") laid over 200,000 miles of routes blanketing the nation and transmitting data at speeds from 155 Mbps up to 10 Gbps.[4] The telephone-wire based connections between the ISP and the user—called "the last mile" and "the last hundred feet"—operate at a logy 28.8 to 56 Kbps.

High-speed connections can transform the Internet experience. At 1.5 Mbps a three-minute song downloads in 13 seconds, as opposed to six minutes with a standard modem. A two-and-one-half-minute video clip takes 47 seconds instead of 21 minutes.

Faster last-mile connections have long been available, for a price. Institutions needing more than 10 or 12 Internet connections must obtain special high-speed lines, called T1 or T3, which have existed since 1960.[5] Over the past 15 years, most of these lines have been converted from copper to fiber, creating the potential for virtually unlimited capacity.[6]

Fiber costs too much to be installed over the last mile to residences; no revenue stream now foreseeable would recover the current costs.[7] Writers on high-tech assume that fiber to residences will happen, but only gradually, perhaps over decades. However, industry sources say that new fiber systems are under development, some of which claim to cut by two-thirds the installation cost for last-mile residential fiber, which currently approaches $5,000 per subscriber.

For example, an experimental technology called SAM, for Sewer Access Module, relies on a robot to install last-mile fiber in municipal sewer lines.[8] Current costs are comparable to digging, but they may come down, and the installation time is cut in half.

Even without affordable fiber, technologies for high-speed connections are available now or are coming on-stream that rely primarily on existing telephone and cable TV lines, or that require no wires. These transmit at speeds ranging from 200 Kbps to 1.5 Mbps and can be priced at only $40 or $50 per month, cheap enough for residential and small-business use. They include:

Cable TV lines. The coaxial cables that carry TV signals can also carry the Internet, and approximately three million households are now connected, at speeds ranging from 200 Kbps to 1.1 Mbps downstream and 100 to 200 Kbps upstream.[9] Almost all of these are residential customers, because cable has two disadvantages for business use: Performance degrades as the number of users on a loop increases, and providing adequate downstream speed requires that most of the capacity be allocated to communication in this direction.

DSL (Digital Subscriber Lines). Ordinary telephone wires can be equipped with software and switches that send data on frequencies not used for voice communication. As of November 2000, 1.7 million subscribers accessed the Internet via Asymmetrical DSL (ADSL). (Asymmetrical means that speeds are faster downstream than upstream.) Of these, 1.2 million were residential and the balance were businesses or other institu-

tions.[10] Speeds are 144 Kbps to 2.2 Mbps downstream and 90 to 640 Kbps upstream, depending on the distance from the central office. ADSL is inferior for business use because of its lower upstream speeds, and some businesses use more expensive Symmetrical DSL (SDSL) services, which deliver at least 1.5 Mbps in each direction, as much as a T1 line.

DSL lines are geographically limited. For ADSL, the subscriber must be within 18,000 feet of the telephone company central office at the absolute outside limit (and closer for thinner wire), and for faster service he must be closer yet. (However, 80 percent of all local telephone loops are less than 18,000 feet, with the average being 9,000 feet.[11])

Fixed wireless. Wireless Internet connections operating at up to 1.0 Mbps had 144,000 subscribers as of 2000.[12] This technology initially required a clear line of sight and was vulnerable to weather, but newer versions are overcoming these handicaps. The economics of wireless dictate that marketers concentrate on residential and small-business customers beyond DSL range of a telephone central office.

Satellite. Fourteen million households get their TV via satellite. Internet access can be added to TV, and is now used by over 200,000 households. Downstream speeds are 400 Kbps, but upstream links use telephone lines, at a speed of less than 56 Kbps. This limits the utility of satellite connections, especially for business. Nor is satellite suitable for multiuser businesses because of complicated switching problems. Thus, the major current market is for residences in remote areas where no other means of Internet access is economical. However, two-way satellite service is coming on-stream, and already has an estimated 75,000 subscribers.

Other. Yet more technologies are possible:

- Engineers and entrepreneurs salivate over the possibility of solving the technical problems that prevent transmission of data over electric power lines. The answers always seem near, but are not yet within reach.[13]
- A laser-based wireless technology relies on nodes installed on urban rooftops. Data is sent from one to another at speeds of 622 Mbps. Promoters see it as a substitute for both fiber and conventional wireless.[14]
- Communications airplanes working in shifts could supply wireless broadband over a 60-mile diameter. The idea's originators say that three planes could supply the equivalent of 6,500 T1 lines.[15]

Which technologies will pay off and which will become road kill is impossible to predict. It is also difficult for businesses to assess the economic feasibility of these non-fiber technologies in the face of uncertainty about the future installation costs of fiber systems that might provide superior service. Billions of dollars turn on the answers to these questions.

Regulatory structures. The different broadband technologies are regulated under a mishmash of inconsistent statutory and regulatory structures.

DSL lines are treated like telephone service-providers are "common carriers" which must serve all comers. Cable TV has no common-carrier obligation, but, as described below, FCC recently indicated that it is willing to impose similar rules in the guise of open access for ISPs. Also, until the 1992 cable act limited the granting of exclusive franchises, cable companies were granted local monopolies, and the effects of this benighted policy still roil the field. Wireless and satellite are subject to different regimes.

The government, in the form of FCC, Congress, or various executive agencies, continually tries to fine tune communications policy and competitive structure. The Telecommunications Act of 1996 is full of such efforts. This philosophy does not inspire confidence, because FCC has a deeply troubled history: It suppressed FM radio from the mid-1930s until 1960, left UHF spectrum underutilized for decades, delayed cable TV for almost 20 years, and is only now allowing satellite radio, which has languished at the Commission since 1990.[16] One analyst describes recent FCC policy as "preoccupied with giving long-distance providers advantages over local carriers; cable competitors and Internet firms over traditional telephone carriers; and wireline over wireless providers."[17] Hopefully, new appointments to FCC herald a renewed emphasis on reliance on market forces.

Specific policy issues. In the 106th Congress, several bills were introduced with the avowed purpose of accelerating the deployment of broadband so as to enhance competition and promote access by underserved populations. These, or variations, are expected to be re-introduced in the 107th Congress.

Analyst Adam Thierer ranked these bills according to whether a proposal would promote both deregulation and increased reliance on competitive forces. S. 1043 received an A; H. R. 2420 a B; S. 877 a C; H. R. 1686 a D; and H. R. 2637 an F.[18]

Number	Sponsor	Title
S. 1043	John McCain (R-Ariz.)	Internet Regulatory Freedom Act
H. R. 2420	Billy Tauzin (R-La.) John Dingell (D-Mich.)	Internet Freedom & Broadband Deployment Act
S. 877	Sam Brownback (R-Kan.) Don Nickles (R-Okla.) Larry Craig (R-Idaho)	Broadband Internet Regulatory Relief Act
H. R. 1686	Bob Goodlatte (R-Va.) Rick Boucher (D-Va.)	Internet Freedom Act
H. R. 2637	Earl Blumenauer (D-Ore.)	Consumer & Community Choice in Access Act

Those advocating more government intervention have difficulty finding a problem that needs to be solved. Two issues are cited: broadband deployment and open access to broadband connections by all ISPs. Upon examination, neither area seems to present problems serious enough to justify the harm inherent in intervention.

Broadband deployment. According to FCC, the Internet backbone already blankets most of the nation; it is accessible directly or through fiber middle mile in 59 percent of the zip codes, representing 91 percent of the population.[19] Because Internet backbone and middle-mile connections reach virtually every local telephone exchange, DSL can be made available to most telephone users. Further, because Internet backbone/middle mile connects to telephone exchanges, the superior (but more costly) T1 and T3 lines needed by business users are also accessible.

Facilities needed for coaxial broadband are also widely available. Cable TV has 69.3 million subscribers and runs past 97.7 million of the nation's 102.5 million households; 75 percent of this cable plant has received the upgrades necessary for Internet access.[20] Satellite and wireless are coming on-line to service remote locations. FCC notes that even consumers in small towns have increasing access to all kinds of broadband services.[21] Furthermore, multiple channels are becoming available, and households will soon be able to choose among Internet access over cable TV lines, over DSL-enabled telephone wires, from wireless systems, or by satellite. Cable TV companies are now "overbuilding"—putting new systems into areas already served by an incumbent cable company, which creates yet more competition.[22]

However, some industry experts raise an important caveat: These raw numbers do not convey the full complexity of the issue. Basic Internet

backbone has extended capacity, but in many sections of the nation, especially areas far from major urban centers, the middle-mile links to it are congested and/or costly. They see a continuing need for more regional backbone and middle mile.

It is neither possible nor desirable for the government to try to fine tune such a confused and rapidly changing situation. In all probability, the primary impact of any government action would be to sow uncertainty, litigation, and delay.

What is needed is not a subsidy or a regulatory program, but deregulation: removal of restrictions, such as those that prevent the Regional Bell Operating Companies from building long-distance infrastructure, or even from transferring data packets over existing lines between FCC-designated local calling areas, or those that prevent other telephone companies from acting freely.[23]

Some observers accuse telephone and cable companies of sloth in upgrading their facilities for last-mile DSL and cable access, and urge government action to goad them. But one can be certain that each company, eager to make money and to lock customers into its version of broadband, is proceeding as rapidly as circumstances permit. If they appear slothful, it is due to technological problems and a climate of regulatory uncertainty.[24]

FCC is concerned about a lack of advanced Internet access by rural residents. But satellites, which provide high-speed downstream access, are becoming ubiquitous. So the only real complaint is that the upstream link may require a toll telephone call, a thin basis on which to build a program of government subsidies.[25] And even that problem will be eliminated by the next generation of two-way satellites.[26]

If some government encouragement of deployment is enacted, tax credits (as opposed to direct subsidies or special regulatory breaks) represent the least destructive approach. But even this is unnecessary and unwise.

Open access (or forced access). Several firms that developed broadband cable planned to bundle access to the Internet with the role of Internet Service Provider. TCI, for instance, provided exclusive rights to an affiliate, Excite@home, while Time Warner systems provided exclusivity to the Roadrunner service.

Many regulators argue that this deprives consumers of choice, and that cable firms should be required to allow customers to access any ISP.

Some cities have imposed forced access as a pre-condition for approving cable mergers, but the courts have struck down such attempts.[27]

At the federal level, FCC long resisted pressure to require forced access. But when the Federal Trade Commission required Time Warner to allow access to alternative ISPs as a condition of its merger with AOL, FCC endorsed the FTC action and added further conditions of its own.[28]

Forced access, like subsidies for deployment, is a solution in search of a problem. Cable companies are not inclined to reject potential customers who prefer an ISP not affiliated with the cable company. AT&T entered into agreements with several ISPs, and AOL Time Warner had no incentive to handicap its cable-access business by insisting on AOL as an ISP.[29]

Even if a cable company were to bundle access and ISP, so what? Given the many means of broadband access to the Internet, there is room for a variety of business models. Some companies might offer bundles of access plus an ISP. Others would go the opposite way, selling an open policy of allowing the consumer to use any ISP. Some ISPs might want to integrate into construction of DSL or fiber access loops.

The agencies' imposition of a forced-access requirement has thrown the area into confusion. Will similar rules be imposed on all other access providers? The openNET coalition, which represents ISPs, is pushing this policy.[30] If not, what distinctions will be drawn? Is the present policy of treating telephone-wire DSL providers as common carriers going to continue? Why would we need a system in which each and every access provider must provide a link to each and every ISP? Existing ISPs could be a prime source of investment in broadband access; have FTC and FCC now made this impossible? Will mandatory-access rules result in lengthy rulemakings and years of litigation, similar to what accompanied the imposition of mandatory-interconnection requirements for telephone companies?

As noted above, building high-speed networks is costly, requiring investment of tens of billions.[31] Uncertainty is deadly; so is a mandate that firms share their networks with competitors on regulated terms. As FCC staff noted in 1999, "Mandated access…could reduce the financial incentives and the build-out capital for cable companies to make the large investments necessary to upgrade their systems."[32] In plain language, this means in some locations the companies—whether cable TV, telephone, wireless, or other—may not be able to deploy broadband profitably unless

they can receive multiple revenue streams, perhaps from a package of ISP access, advertising, and content. If so, open-access requirements could abort the deployment of broadband in many locations.

The example of Open Video Systems (cable connections that act as common carriers and carry programming from any source) is instructive. These were, in theory, to be encouraged by the 1996 Telecommunications Act and FCC. Instead, they are non-existent.[33]

Policy recommendation. Any monopoly power that develops in the course of rolling out broadband technologies will be ephemeral. If the government tries to micromanage the process or subsidize particular technologies, the damage will be long-lived and perhaps permanent, because the effort will create uncertainty and discourage investment.

Rather than create new subsidies or impose new layers of regulation, policymakers should work on deregulation, on eliminating current regulatory barriers to the provision of broadband Internet access.

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[1] The telephone took 71 years to achieve equivalent penetration, and the VCR took 12. Adam Thierer, *How Free Computers Are Filling the Digital Divide*, Heritage Foundation, 20 April 2000; available at www.heritage.org/features/powerpoint/digitaldivide.

[2] The terms "bandwidth" and "broadband," which originally came from physical characteristics of different methods of transmitting information, have become confusing. In discussions of connections to the Internet, they have come to refer simply to the amount of data that can be transmitted per second. FCC, in a laudable effort to simplify the language, uses "high speed" for connections of up to 200 Kbps and "advanced" for faster than 200 Kbps. See FCC, *Deployment of Advanced Telecommunications Capability: Second Report* (August 2000), p. 8; available at www.fcc.gov/broadband.

[3] Ibid.

[4] Ibid., pp. 12, 18. Miles of fiber routes have doubled since 1995. The 200,000-mile figure includes both "backbone," which is the ultra-high-speed interstate transport network, and "middle mile," which is the connection between the backbone and the local telephone exchange offices or cable nodes. These in turn connect to the "last mile," which is the line that passes by consumers' homes. The "last 100 feet" is the final step—it is like a driveway up to a house. FCC, *Deployment of Advanced Telecommunications Capability*, pp. 10-11. The 19 million-mile estimate is as of the end of 1998. Jeffrey Eisenach, *et al*., *The Digital Economy Fact Book*, 2d ed. (Washington, DC: Progress & Freedom Foundation, 2000), pp. 42-43.

[5] Copper T1 lines operate at 1.5 Mbps and cost $400 to $1,000 per month, while T3 operate at 45 Mbps at a cost of $20,000 per month. See "Broadband Special Report," *PC Magazine*, 6 February 2001, p. 141; available at www.pcmag.com. An intermediate service called ISDN operates at 128 Kbps over telephone lines, but it is not sufficiently better than a conventional modem connection to be a major factor. 1960

as the roll-out date for T1 lines is from Regis J. Bates, *Broadband Telecommunications Handbook* (New York: McGraw Hill, 2000), p. 432.
[6] Kim Maxwell, *Residential Broadband: An Insiders Guide to the Battle for the Last Mile* (New York: Wiley, 1999), p. 135.
[7] Ibid., pp. 7-8.
[8] John Schwartz, "A Robot That Works in the City Sewer," *The New York Times*, 8 March 2001.
[9] FCC estimates three million. See FCC, *In the Matter of Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations by Time Warner Inc. and America Online, Inc., Transferors, to AOL Time Warner Inc., Transferee, Memorandum Opinion and Order*, CS Docket No. 00-30, 11 January 2001, para. 65; available at www.fcc.gov/aol_tw.html [hereafter "FCC, AOL TW Opinion"]. *PC Magazine* estimates 3.4 million, "Broadband Special Report," p. 144.
[10] FCC, AOL TW Opinion, para. 65. *PC Magazine* estimates two million DSL subscribers, "Broadband Special Report," p. 144.
[11] Maxwell, *Residential Broadband*, pp. 216-219.
[12] FCC, *Deployment of Advanced Telecommunications Capability*, p. 50; "Broadband Special Report," p. 144.
[13] Maxwell, *Residential Broadband*, p. 112.
[14] Ben Kaplan, "Going to Pod," *mba Jungle* (December 2000/January 2001), p. 23; available at www.mbajungle.com.
[15] Glenn Zorpette, "Winging It," *Red Herring*, 30 January 2001, p. 82.
[16] See Thomas Hazlett, "The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auction Faux Pas, and the Punchline to Ronald Coase's 'Big Joke,'" 15 *Harvard Journal of Law & Technology* (Spring 2001, forthcoming).
[17] Thierer, *How Free Computers Are Filling the Digital Divide*, p. 12.
[18] Adam Thierer, "Broadband Telecommunications in the 21st Century: A Legislative Report Card," *The Heritage Foundation Backgrounder*, 7 September 1999; available at www.heritage.org/backgrounder/bg1318.html.
[19] FCC, *Deployment of Advanced Telecommunications Capability*, p. 37.
[20] Cable Television Industry 2000, www.ncta.com.
[21] FCC, *Deployment of Advanced Telecommunications Capability*, p. 87.
[22] NCTA, Overview 2000, www.ncta.com/sitemap-main.html. The largest over-builder is RCN Corp., which has $6.6 billion, reaches 335,000 subscribers, and is targeting 7.6 million homes in several of the nation's largest cities. Digital Access has $1.3 billion and is targeting 1.2 million homes in several medium-size cities, such as Indianapolis and Milwaukee.
[23] See chapter 6, "Bell Entry into Long-Distance Service."
[24] See "Highway to Hell," *Forbes*, 19 February 2001, p. 98; available at www.forbes.com/forbes/2001/0219/098.html.
[25] FCC, *Deployment of Advanced Telecommunications Capability*, p. 88.
[26] See Christopher Locke, "Hughes: The Boss," *Red Herring*, 12 February 2001, p. 84.
[27] *AT&T v. City of Portland*, 216 F.3d 871 (9th Cir. 22 June 2000). For a review of local efforts and the ensuing litigation, see William E. Lee, "Open Access, Private Interests, and the Emerging Broadband Market," *Cato Institute Policy Analysis*, no. 379, 29 August 2000; available at www.cato.org/pubs/pas/pa-379es.html.
[28] FTC, *In the Matter of American Online, Inc., and Time Warner*, 14 December 2000; available at www.ftc.gov/os/2000/12/index.htm. FCC, AOL TW Opinion. FCC also imposed requirements on AOL concerning the interoperability of its Instant Messaging service. This is related to the forced-access requirement, but poses some different issues, and is not covered in this analysis.

[29] For the statement of the case in favor of forced access, see the agency orders cited in note 28 above. For a supporting academic analysis, see Francois Bar, *et al*., "Access and innovation policy for the third-generation internet," 24 *Telecommunications Policy* 489 (2000); available at www.stanford.edu/~fbar/Publications/index.html.
[30] www.opennetcoalition.org.
[31] For example, in addition to investment in central-station hardware and software, a cable company must create a hybrid fiber coaxial (HFC) network by running a fiber line to a neighborhood node from which the signal travels over coaxial cable to the individual homes. The cable TV industry says it invested $41 billion in cable infrastructure from 1996 to 2000. Cable Television Industry 2000, www.ncta.com. Much of this is necessary for improved television, of course, especially given the increasing competition from satellites.
[32] Staff of the Cable Services Bureau, FCC, *Broadband Today: A Staff Report to William E. Kennard, Chairman* (October 1999); available at www.fcc.gov.
[33] For a quick look at the complexity of the regulatory requirements imposed, see *City of Dallas, Texas v. FCC*, 165 F.3d 341 (5th Cir. 1999).

INTERNET PRIVACY

In conjunction with the release of its annual Internet privacy report in May 2000, the Federal Trade Commission asked Congress for the authority to regulate on-line information practices.[1] Aside from doing little to improve the state of privacy on the Internet, new regulations would stifle innovation, raise costs to consumers, and create a new universe of victimless crime.

Background. Companies gather information about consumers on-line, just as they do off-line, to more accurately target their advertising. They do this two ways. The first is by asking visitors to fill out a form when they visit a site. Consumers can refuse to do this, but often this is a prerequisite for gaining access to that site's services or information. In this sense, the consumer's information acts as currency on the Internet. A 1999 study found that 86 percent of Internet users polled wanted the ability to exchange their personal information with websites, as long as they knew the benefits for doing so and were informed about the use of their data.[2]

The second way companies gather information is more controversial, but no less benign. Tiny files known as "cookies" are sent to the user's hard drive to keep track of the sites he visits and the advertisements that catch his attention. If consumers prefer, they can set their browsers to ask them before accepting cookies or to block them entirely (it takes four clicks on Microsoft's Explorer).

The May 2000 FTC Internet Privacy report verified the increasing state of information-notification practices on commercial websites. The number of sites in the "most popular" sample that have posted privacy policies was up from 14 percent in 1998 to 66 percent in 2000. Similarly, a random sample of all websites returned an 88 percent posting rate this year.[3] However, FTC brushed over these improvements and took issue with the substance, or lack thereof, of these privacy policies, and then asked Congress for the authority to regulate them.

It is in businesses' interest to meet consumer demands. Simple as that sounds, it is a notion foreign to bureaucrats and leg-