December 3, 2001

bandwidth

An Online Newsletter of Discovery Institute

DSL Delusions: More Bad History, and Even Worse Policy

By: Senior Fellow John Wohlstetter

What Crisis? Look at All That Investment!

According to the investment banking firm Lehman Brothers, Bell company negative cash flow for Digital Subscriber Line (DSL) deployment was $2.5 billion in 1999, $3.7 billion in 2000, and is estimated to be $3.8 billion for 2001[1]. So, say defenders of existing FCC broadband policy, clearly the Commission's rules have not deterred investment. To the contrary, the existing rules surely must be hospitable to network upgrades, and so no reform is needed. The argument is wrong but in fairness it is hardly frivolous.

A companion legend, *i.e.*, that the Bells "sat on" DSL until competition post-1996 forced them to invest, has become a staple of anti-incumbent policy advocacy[2]. This second tale comes in two flavors: that cable modem deployment forced DSL into the residential market; and that the Bells are still sitting on DSL for business users because cable companies are not targeting business.

Best to address these arguments in reverse order, as the historical myth forms the backdrop for the "what about the $10 billion?" argument.

It Took the 1996 Act Plus Cable Modems to Pry DSL Loose…Or Did It?

If a story seems too good to be true, it usually is, and this is no exception. *Neither the 1996 law nor the subsequent advent of cable modems had a thing to do with DSL's development, which began nearly a decade earlier*. The DSL family of technologies[3] (DSL serves as a generic term) was conceived as a high-bandwidth sequel to the ISDN digital network standard that began in 1985 the long process of extending digital connectivity to the customer's premises[4]. Work that started in 1989 at the post-AT&T divestiture organization then called Bellcore[5] was picked up by Stanford University and AT&T Bell Labs in 1990. DSL prototypes were first tested in 1992.[6]

DSL was unveiled on June 14, 1993, by Bell Atlantic (since combined with NYNEX and GTE to form Verizon Communications). Bell Atlantic introduced the service in Northern Virginia, featuring near-video-on-demand (NVOD) movies[7]. Bell Atlantic's offering was the residential DSL configuration known in the trade as Asymmetric DSL (ADSL, the most common DSL version). The asymmetry is, as anyone sending a large file quickly finds out, that with ADSL downloads (receiving) information run much faster than uploads (sending).

Among the elements necessary for DSL to work were two still in their relative infancy when Bell Atlantic went forward. Distribution of DSL modems was needed to convert analog signals into digital format (and vice-versa); in 1992 a typical DSL modem cost around $5,000, compared to about $200 today[8]. A signal modulation standard was also needed, to enable carriage of digital signals across the network. The so-called DMT standard that become the DSL format of choice was proposed in 1993 by Amati Communications, and was adopted as the industry standard in 1996[9]. *Far from sitting on DSL, Bell Atlantic rolled out the technology even before a final industry standard was adopted.*

Bell Atlantic's NVOD was one of a plethora of broadband trials by phone and cable companies in the early 1990s; other notable efforts included GTE's Cerritos, California integrated voice/data/video, and Time Warner's Full Service Network in Orlando, Florida. *Without exception, every major trial of broadband video*

launched prior to passage of the 1996 Telecom Act flopped. Consumers were happy to have the service—provided they did not have to pay much for it. Compounding matters were technical glitches such as inadequate servers—providers loaded movie videocassettes into their video racks by "sneaker-net" (computer industry slang for manual porting of files between computers).

And While Bell Atlantic Went to Market, What Were the Feds Up To?

While Bell Atlantic was unveiling Video-Over-DSL, what was the FCC doing? Locking the Bells into video dial-tone, which restricted them to providing mere transport, leaving content to rivals. That policy lasted until August 1993, when Judge T. S. Ellis of the Northern Virginia federal District Court tossed out the content prohibition on First Amendment grounds. *Thus, while Bell Atlantic was rolling out DSL technology, the FCC (joined by the National Cable Television Association[10]) was litigating in court to limit the market for Bell Atlantic's service* (to dial-tone's roughly 30 percent of what was then a $20 billion market).

Intel, 3Com, US Robotics, Microsoft, Netscape: Cyber-Posse to the Rescue!

After Video DSL flopped, came August 1995: the market debut of Microsoft's *Windows95* and the IPO for Netscape Communications, whose flagship product, *Netscape Navigator*, was the first mass market Internet browser. Put together on Intel's personal computers with the Pentium chip developed by Intel plus faster dial-up modems and voila, the mass market Internet was born. DSL was revived as a data service, with video a distant second due to bandwidth limitations.

But Not So Hot For Business

At year-end 2000, 5.2 million out of 7.1 million high-speed lines were for either residential or small business users: 68 percent of DSL lines and 92 percent of cable modem lines[11]. The charge is frequently made that the Bells are protecting their investment in T-1 lines, which provide the same speed as mid-range DSL. But this argument is wrong, because DSL is at best a shaky substitute for T-1 lines. T-1 is fully bi-directional—*i.e.*, provides equal dedicated bandwidth in each direction, unlike most flavors of DSL. T-1 is also notably less distance-dependent than DSL, whose practical effective range is roughly 18,000 feet. Thus it is no surprise that T-1 remains the current corporate broadband link of choice, with 99 percent of the corporate high-speed transmission market[12].

And Not So Hot For Residences, Either

Sharing of capacity slows both DSL and cable modem speeds to a few hundred kilobits per second rather than the megabit speeds advertised. DSL offers dedicated access only to the central office—even there the loop is shared per FCC rules if a requesting carrier wants it; from there on out into the network capacity is always shared. Shared access makes for less reliability than does a dedicated link. In the event, with 70 percent of the DSL residential/small business market at end-2000 (the other DSL market segments are medium and large business) the Bells can hardly be accused of holding the service back[13].

And Now, On to the Ten Billion Dollar Misunderstanding

Yes, the Bell companies are indeed investing money—loads of it—in DSL. If the FCC's rules are so harmful, how come they are investing so much? Consider the following options: (a) defer investment until, if ever, regulatory changes make investment financially attractive; (b) invest under adverse regulatory rules, hoping that the rules can be changed in time to turn a profit on DSL investment.

The first option of this Hobson's choice would have the Bells cede the entire wireline broadband market to their cable rivals—with wireline representing 95 percent of the total broadband data market—until regulations might be changed after years of struggle. DSL rules have already been in place for two years, and legal challenges are still underway. While companies press for regulatory change or court reversal, cable firms deploy their service, true up the technology, and learn how to market to and support their broadband customer base. Broadband is considered a "sticky" service—one which customers, once signed up for any length of time, rarely switch (wireless, by contrast, has about a 25 percent annual "churn" rate). Thus, by the time rules might be changed the game would likely be over. And not only for first-generation data services, but quite possibly for the next generation of broadband as well.

So the Bells took instead the second option: invest up front, while seeking fairer rules of engagement. They can thus "true up" their technology and learn abut their customers in parallel with their cable rivals. Given the "stickiness" of broadband access it is hard to see how they could have done otherwise. Therefore Bell DSL investment does not establish that FCC rules are hospitable to them. Rather, market imperatives (of which the FCC was well aware all along) drove the Bells to make defensive investments even in an unfavorable climate.

Some DSL rollouts have, despite the above, been cancelled, most notably SBC's Project Pronto rollout in Illinois. Pronto is particularly significant, because SBC was planning to put fiber into the local loop, part of the way towards the home. This would enable far higher bandwidth service, opening the promise of true broadband—high quality and high speed. Because the Illinois regulators wanted all customers served rather than merely those who could be economically served, SBC pulled the offering in the state.

From Mayberry R.F.D. to Mayberry DSL

Bad regulations distort market rollout in other ways as well. The investment banking house Legg Mason shows DSL penetration at 3 to 4 percent, versus 1.5 percent in urban areas; over the next 5 to 10 years the firm estimates that the nation's 1,300 independent telephone companies will add from 10 to 30 million lines on top of today's 13 million line total[14]. *Not* a misprint: *non-Bell phone companies are installing DSL at twice to nearly three times the rate that the Bells are*. What gives?

Independent companies face fewer competitors than their urban cousins. *FCC rules adverse to DSL investment mean less to rural carriers, as they face fewer entrants seeking to take advantage of the joys of below-cost access and "rip-apart-the-incumbent's network" unbundling*. Put another way, rural DSL investment is less likely to be poached and socialized for the benefit of others.

Do the Baby CLECs Have a Chance Against the Baby Bells?

According to Yankee Group, at end-first-quarter 2001 the Competitive Local Exchange Carriers (CLECs) had a DSL market share of 20.7 percent, right in the middle vis-à-vis the four Bells. With SBC leading at 33.1 percent, Verizon second at 25 percent, and the Qwest and BellSouth bringing up the rear at 10.6 and 10.5 percent, respectively[15]. Thus the collapse of the CLECs is not due to inability to lure customers away from the Bells. Rather, FCC policies pushing below-cost access to incumbent facilities artificially inflated the number of CLEC entrants beyond the number that market conditions would have permitted, and thus penalized facilities-based entrants by subsidizing below-cost entry. The upshot was that the universe of Bell defectors was divided up among more than two hundred entrants. Had entry been limited by market forces to the 10 percent of CLECs that actually built new facilities those would have made for fewer, but far stronger, competitors. Instead, weak sisters simply piggybacked on incumbent networks, added little if any value and siphoned off defectors from the more solid CLECs. This "help the weak, hurt the strong" FCC policy drove the CLEC sector implosion.

And How Go the Telco-Cable Wars?

Figures more recent than the FCC's recently-released end-2000 numbers show DSL investment slowing down, as cable modem deployment proceeds apace. In the second quarter of 2001, DSL growth was 14 percent, compared to 20 percent in the first quarter and 41 percent for the last quarter of 2000. Meanwhile, cable modem growth has remained steady at 20 to 25 percent through the first half of 2001[16]. Cable modem deployment has gained ground in 2001: Morgan Stanley estimates that cable garnered 64 percent of new broadband access customers in the second quarter, up from 59 percent in the first quarter[17].

The DSL equipment picture is no cheerier for the Bells. For North America, DSL equipment vendor revenues also declined in the first half of 2001, 44 percent versus the preceding 6 months and 6 percent versus the first quarter of 2000; broadband digital loop carrier also declined 35 percent in the first half of 2001 compared to the same period a year ago[18].

From DSL Delusions to Broadband Solutions

It is fair to point out that poor implementation of DSL has been part of the reason that DSL trails cable modem deployment; complaining customers are not happy ones, and adverse regulation is not accepted by them as an excuse (nor, needless to say, should it be). But regulatory policy that substantially inhibits DSL deployment created organizational impediments as well—preventing the Bells from one-stop provision of DSL clearly impairs service efficiency.

In sum, that significant DSL investment has been made despite inhospitable regulatory policy should not be taken as vindication of such rules. Market forces should determine DSL deployment. Bell companies lack market power in broadband, as cable modems have at least twice the market share taken by the Bells[19]. Taking advantage of a market squeeze to leave the Bell companies with little choice but to invest massively even under unfavorable regulatory rules is a prime example of regulatory opportunism on the part of the FCC and state public utility commissions. New DSL investment should be exempted from legacy rules.

With DSL delusions, as with "fiber-optic fables," bad history makes for bad policy. The Bells are entitled to relief that enables them to reap the rewards of new broadband investment. The ultimate beneficiary of such relief will be customers.

---

1 Figures given by Blake Bath, Lehman Brothers analyst, at CATO Institute, July 24, Broadband and the Market: Perspectives From the Investment Community. < http://www.cato.org/events/010724pf.html >

2 The Man in the Middle: FCC Chairman Michael Powell Talks About Walking the Tightrope of Telecom Regulation. Wall Street Journal, p. R19, Sept. 10, 2001.

3 There are many DSL varieties. A sampling of the key flavors: ADSL is typical residential service, with downstream speeds (server to customer) running 640 kb/s to 7 Mb/s, with 1.5 Mb/s the most common, and upstream speeds (customer to server) running 64 kb/s to 640 kb/s; the "R" in RADSL denotes "Rate adaptive, and thus adjusts transmission speed to conditions on a particular copper loop; the "S" SDSL is for "Symmetric" (sometimes called "Single line"), and refers to DSL service with identical downstream and upstream speeds; the "H" in HDSL means High bit-rate, and refers to service providing T-1 speeds (1.5 Mb/s0 in both directions—currently, HDSL requires two copper lines, unlike other DSL varieties; and the "V" in VDSL stands for Very high bit-rate, and runs from 13 to 52 Mb/s, depending on loop distance.

4 ISDN stands for Integrated Services Digital Networks. The version of ISDN mentioned in the text is also called N-ISDN, for Narrowband ISDN. N-ISDN offered users a pair of 64 kilobit per second Bearer "B" channels and a 16 kilobit per second data "D" channels—so-called 2B + D; the B channels were for voice or data circuit connections; the D channel was a packet-switched connection dedicated to signaling.

5 Bellcore was the acronym for Bell Communications Research; it is now known as Telcordia Technologies.

6 Starr, Thomas, Cioffi, John & Silverman, Peter, Understanding Digital Subscriber Line Technology, pp. 30-31 & 42-43 (Prentice-Hall PTR 1999).

7 The author attended the opening presentation, at Bell Atlantic's Courthouse Road facility in Arlington, Virginia. Bell Atlantic sent a 1.5 Mb/s signal down 7,800 feet of copper wire in the demonstration, i.e., roughly equivalent to today's mid-range DSL speeds. Video trailers were downloaded over 10-year-old copper wire, from an IBM server, using Motion Picture Experts Group MPEG-1 compression.

8 Another factor was that Digital Signal Processing (DSP) chips lacked the processing power to make DSL commercially viable before the early-1990s; current DSP speeds reach a billion instructions per second, a speed comparable to the fastest Pentium III CPU chips for PCs.

9 DMT is Discrete Multi-Tone, a type of modulation scheme that carries signals over frequency-agile spread spectrum. Amati Communications was acquired later by Texas Instruments.

10 The "T" in NCTA now stand for "Telecommunications"—a sign of the Internet era.

11 High-Speed Services for Internet Access: Subscribership as of December 31, 2000, Industry Analysis Division, Common Carrier Bureau, Federal Communications Commission (August 2001).

12 What Bandwidth Boom?, Internet Week, Sept. 11, 2001.

13 Federal Communications Commission Releases Data on High-Speed Access for Internet Users (Aug. 9, 2001).

14 Heard on the Street: Rural Telecom Shares Are Looking Idyllic, Wall Street Journal, pp. C2, Aug. 23, 2001.

15 Digitally Disenfranchised, New York Times, p. E1 (Aug. 6, 2001). Another report has Yankee showing the phone companies with 82 percent of business DSL and 92 percent of residential DSL. Rhythms Tells Customers It Will Close, Wall Street Journal, p. B3 (Aug. 13, 2001). This figure conflicts with those given in the text, but given the specific figures for the DSL players the text figures appear more likely correct. The FCC's overall figures show an 84 percent overall DSL share, but this makes the 92 percent residential number improbable: residential is most of DSL and would thus pull the total phone share over 84 percent, were the business DSL share for the Bells the 82 percent the FCC believes it is.

16 Beware, Baby Bells, Business Week Online, Aug. 21, 2001.

17 BellSouth's Down-Home Strategy, New York Times, p. C1, at p. C3 (Sept. 3, 2001).

18 Source: RHK, Inc. For first half 2001 versus first half 2000, in North America, DSL vendor revenues declined to $729 million versus $1.3 billion, and broadband digital loop carrier equipment sales declined to $703 million from $1.1 billion. Broadband Week Direct, Sept. 26, 2001.
< http://www.broadbandweek.com/newsdirect/0109/direct010926.htm >

19 Cable has 70 percent of the integrated broadband market, DSL 25 percent and wireless (mostly satellite) 5 percent. The Bells have 85 percent of the DSL market, but this is a subset of the total broadband market.

bandwidth
Is published by Discovery Institute

Discovery Institute is a non-profit, non-partisan, public policy think tank headquartered in Seattle and dealing with national and international affairs. For more information, browse Discovery's Web site at:
http://www.discovery.org

DISCOVERY INSTITUTE

To subscribe or unsubscribe to *bandwidth* or to forward a copy of this issue to a friend visit:
http://www.discovery.org/bandwidth

Discovery Institute's mailing address is:
1402 Third Avenue
Suite 400
Seattle, WA 98101

Questions and comments may be emailed to:
mailto:wohlstetter@discovery.org