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Sag Harbor Group White Paper

What Became of the Broadband Revolution?



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What Became of the Broadband Revolution?

“If people don’t want to come out to the park, nobody is gonna stop them.”

-- Yogi Berra

Introduction

Time is short and we are all in a hurry, trying to survive in these troubled times. So at the risk of disappointing the academics in the audience, let us quickly stipulate to the following key stylized facts that will set the table for the paper’s central issue – why has the growth of high-speed broadband services in the US stalled, and what, if anything, should we do about it?

1. **Broadband Market Setbacks.** Of course all major Internet-related markets have taken a sharp hit in the last two years. But compared with expectations, the growth of the number of residential and business customers with high speed access in the US market has been especially disappointing.¹
 - Some of us are old enough to remember the early 1990s, when the first wave of broadband hype passed by, complete with projections that “interactive TV” and “video on demand” would be available to Bell Atlantic customers by 1996, and that more than half of the US households, not to mention all schools and hospitals, would have fiber connections by the year 2000. Needless to say, these “Real Soon Now” projections have long since been deep-sixed in the official telco and cable industry archives.
 - The overall number of US Internet connections has slowed dramatically since 2000. Growth was flat for most of 2001, and only resumed at a historically low rate of less than 10 percent a year this year, reaching 137 million active users by April 2002 (out of a total US population of 278 million).² Indeed, partly because of economic troubles, the number of Internet connections for the poorer and blacker segments of the population are now *declining*.
 - While broadband’s share of Internet connections continues to rise, it is growing much slower than expected. For example, out of 66 million households connected to the Internet in January 2002, only 13.3 million had broadband connections (DSL or cable modems). This was far below the 20-30 million or more routinely predicted

¹ The statistics cited here are the most recent available data from the invaluable website Internet.com, which pulls together data from industry sources like ARS Inc., Nielsen, IDG, Yankee Group, and Gartner. Many such data have serious inconsistencies when examined in detail; those figures cited in the text are intended to be illustrative of the basic trends, and not precise.

² Nielsen data.

just two years ago by many industry forecasters.³ This implies a broadband household penetration rate of just 10 percent, compared with Canada's 22 percent and South Korea's nearly 40 percent – and compared with the 33-37 percent rates that many industry observers were predicting for the US by 2003.⁴ This is despite the fact that more than 81 million US homes are now passed by cable broadband, and about 52 million by DSL-capable phone lines. Only about 6 percent of US businesses now have broadband access.

- The US shortfall in DSL connections, in particular, has been especially noticeable - worldwide, while there are now more than 19 million DSL users, the US accounts only about 5.5 million of them, and has slipped from fifth to tenth in the number of DSL connections per capita.
- Meanwhile, the cable industry is now focusing most of its attention on so-called “interactive digital TV” – a still largely passive upgrade to existing TV entertainment that is really a misnomer (see below.) Compared with 7.2 million US cable modem subscribers and 1.5 million cable telephony customers at the end of 2001, there were already more than 15.2 million “digital TV” customers in the US – a penetration rate for this passive service twice as high as for truly interactive Internet broadband. This indicates that much of the problem is rooted in customer preferences – and the protectionism shown by broadband's dominant suppliers in the US, the cable companies, for their (more profitable) subscription TV, pay-per-view business, and home shopping businesses.
- While the number of broadband connections continues to grow, unlike dial-up connections, there has been a significant slowdown, with quarterly broadband growth falling from 39 percent in Q1 2000 to less than 14 percent in Q1 2002, and to less than 10 percent in QII 2002. True, broadband connections do now account for a slight majority of online hours consumed. But this is misleading, because many cable and DSL connections are “always-on.”
- The actual number of so-called “broadband” subscribers is *overestimated* by these figures, if we are talking about the number of subscribers who are capable of receiving (much less sending), more than, say, 1 Mbps, the desired minimum for many multimedia and video streaming applications. In fact “broadband” lumps together all connections with data rates greater than 56 kbps, while most “broadband” subscribers actually sign up for services that only provide a theoretical maximum of 384 kbps or less. In the case of shared networks like cable, where the actual bandwidth for any given subscriber depends on how many other users are on the network, bandwidth available per user is usually well under half the 1 Mbps level.
- While selected foreign markets like Japan, Canada, South Korea, Singapore, Taiwan, the UK, and Germany have strong broadband demand, and countries like China may eventually also offer huge broadband markets, the US still accounts for at least forty

³ See the roundup of industry forecasts for US broadband household subscribers that were made in 2000, for 2002 and beyond at www.eMarketer.com. Among the examples: Forrester (18.89 mm, 2002; 27.73 mm, 2003; 37.01 mm, 2004); Gartner Dataquest (16.08 mm, 2002; 21.85 mm, 2003; 27.6 mm, 2004); Strategis (17.55 mm, 2002; 23.52 mm, 2003; 29.6 mm, 2004); and Ovum (20.24 mm, 2002; 26.56 mm, 2003; 33.72 mm, 2004). See also Cahners In-Stat Group, June 13, 2001, forecasting 21 million US broadband subscribers by the end of 2001 (!), and a whopping 84 million by 2005!

⁴ See NUA/IDC's October 1999 forecast, for example, that US household penetration for broadband would reach 33 % by 2003, and Gartner's October 1999 forecast that it would reach 37% by 2003.

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percent of the world's broadband users. If broadband services, applications, and hardware are to prosper, therefore, the US market's influence is crucial. _____

2. **Stagnation and Consolidation on the Supply Side.** Consistent with this slowdown in US broadband access growth, as of January 2002 the top six US Internet service providers were still just dial-up providers -- AOL (29.6 dial-up customers), MSN (9 mm), United Online (5.6 mm), Earthlink (4.8 mm), Prodigy (3.6 mm), and Compuserve (3.0 mm). Of the dial-up only ISPs, only Prodigy -- now owed by SBC -- and Earthlink have so far made serious attempts to convert its users to broadband services. One of the key obstacles here is raw economics -- if independent ISPs in the US want to resell broadband service to their customers, they find that cable companies charge them as \$34/month/ user for wholesale service. This leaves a razor thin margin for ISPs, so few are offering resale.

- The largest single broadband provider, AOL's Roadrunner cable modem service, had just 1.917 mm subscribers as of January 2002. With this one exception, all the other leading broadband providers were either telcos (mainly local exchange carriers) or cable TV companies.⁵
- Fixed wireless broadband access, which was once expected by industry analysts to account for nearly 4 million users by 2003,⁶ has so far been almost completely missing in action. Major US telcos like Sprint and MCI/Worldcom toyed with launching licensed fixed wireless services in 1999-2000, but have put these wireless pilots on hold. Numerous independents like Worknet, Teligent, Winstar, and Spike have long since bitten the dust.
- Most independent CLECs that were providing DSL services, like Covad and Northpoint, have also disappeared in the last two years. So, for that matter, have many of the original leaders in the "optical networking" /"next gen backbone networking" industry, including Global Crossing, Level 3, Enron's Bandwidth Group, and Williams. Collectively these and other global network players spent *more than \$1.5 trillion* on network backbone infrastructure in the last five years -- far too little of it showing up in faster access for the "last mile."
- Efforts to launch higher-speed 802.11-based access services at selected "hotspots" (hotels and airports) by companies like Mobilstar have also gone the way of all flesh. There have been some recent efforts to restart high-speed access around unlicensed spectrum provided by networks of affiliated "public 802.11 WLANs" by companies like Boingo, but these are early experiments. Experiments with high-speed satellite Internet services have also failed to gain much market traction.
- This slowdown in broadband access growth has had a serious impact on the whole broadband network hardware/ access device industry (including cable and DSL modems and set top boxes), as well as on would-be independent content, software, and service providers that based their marketing plans for services and applications like Internet video- and music-on-demand, real-time multimedia streaming, interactive network games, real-time conferencing, voice over IP, and voice over

⁵ These included AT&T Broadband (1.512 mm cable, .3 mm DSL), SBC's DSL service (1.3 mm), Verizon's DSL service (1.2 mm), Comcast (.948 mm), Cox (.884 mm), Bellsouth's DSL (.6 mm), Charter (.608 mm), and Cablevision (.507 mm).

⁶ See www.eMarketer.com, October 16, 2000 forecast for fixed wireless broadband subscribers. As of yearend 2000, by comparison, there were a total of 230,000 fixed wireless broadband subscribers (business and residential) in the US.

DSL on projections that proved optimistic. While there have been host of Internet startups that have working on broadband-related new services and content, few have prospered.⁷

- In addition, to the extent that the demand for higher-speed multimedia-oriented PCs and associated peripherals (digital cameras, color printers, speakers, hard disks, CD burners, etc.) is driven by the supply of high-quality, competitively priced broadband network access services, especially to homes, this broadband service slowdown has also reinforced the current US PC industry slowdown.

Factors

Of course broadband access is scarcely the only Internet- or technology-related US market whose size and growth was wildly over-predicted by industry savants and investors. For example, as we documented in our white paper on “The Future of Mobile Wireless” (NY: Sag Harbor Group, February 2002), there was even more excess optimism about the prospects of the global mobile wireless industry. In that case, by highlighting the factors that contributed to most notable exceptions to this stagnation – NTT Docomo’s success with wireless Internet services in Japan, for example -- Sag Harbor Group was able to trace the wireless industry’s disappointing takeoff to several key supply- and demand-side factors, especially:

- ❑ **Closed Platform/ “Walled Garden” Approach.** The global wireless industry’s inability to provide (except for NTT Docomo) a standard, cross-network application development platform and an “open systems” content distribution model that could encourage the development of services and content that customers actually valued.
- ❑ **Supply-Side Focus.** The global wireless industry’s “supply-side”, “build it and they will come” mindset – e.g., its fixation on “advanced high-speed networks and devices” as goals in themselves, apart from their ability to satisfy actual customer needs - - and, concomitantly, its almost total lack of effort to understand these needs in any detail.
- ❑ **Inflexible, Capital-Intensive Strategies.** The resulting overemphasis on network-, hardware-, capital- and license-fee intensive strategies that ignited spending sprees and corporate deficits that bankrupted many of the industry’s leading service providers, and significantly delayed deployments of new networks and services.
- ❑ **Weak Competition in Local Markets.** One great feature of a free market, when it works, is that it encourages multiple suppliers to experiment with different approaches to satisfying customers. However, in the case of mobile wireless markets, spectrum licensing and the laws of physics combined to severely limit the number of service providers that could operate in particular local markets.
- ❑ Where, as in the case of NTT DoCom, a dominant provider decided for reasons of its own to pursue an enlightened strategy focused on customer value, market structure didn’t necessarily interfere with growth. However, where carriers and industry suppliers pursued their own high-cost, supply-side biases, there was little competition to reign

⁷ See, for example: www.wirebreak.com, a developer of “interactive TV shows; www.filmclix.com, an independent Internet film distributor; www.AtomFilms.com, another short films distributor; www.Centerseat.com; www.Ifilm.com; and www.Entertaindom.com. See also www.shockwave.com, which provides a platform for the distribution of multimedia and cartoons over the Web.

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them in. And the prevailing regulatory bodies, often the prisoners of incumbent interests, did little to curtail this behavior.

□ **Few “Killer” Applications So Far.** All these wireless industry shortcomings might have been overcome if someone had simply managed to produce applications – other than voice, of course -- that everyone simply had to have. So far, however, except for simple messaging (including SMS), this has not been the case – although we’ve seen a plethora of attempts, including “location-based e:commerce,” “real time streaming data and multimedia,” creative ringtones, and mobile games.

Broadband’s Similar Pathologies. In the case of the broadband access market, while the details are quite different, from a slight distance we find very similar “retardant” patterns at work.

□ **Content and Distribution Monopsonies.** With respect to broadband content, the behavior of industry incumbents -- cable companies, telcos, and multimedia producers -- has combined to severely limit customer access to existing multimedia content and the development of compelling new content and applications in several ways:

□ **“Fair Use” – It’s Only Fair if You Pay for It.** Traditional producers and distributors of music and video content have been preoccupied with building fences around their existing property rights to defend them against the kind of poaching – royalty-free copying and sharing – that has been enabled by digitalization, as illustrated by Napster. Their priority has not been to make broadband content as enticing and widely available as possible. Rather, it has been to seek new legislation to defend and even increase the “rents” they realize from existing property rights -- including unprecedented control over content and “fair use” in digital channels, digital encryption schemes designed to make copying and sharing more difficult than ever, and new penalties for tampering with their media.

□ **Telephony Cannibalization.** The critical role in the broadband supply chain that telcos and cable TV companies have come to play has also restricted the supply of new content and services. Telcos, for example, are in theory well positioned with customers to offer first-rate VOIP and VO-DSL services. But they also have the greatest concerns about “cannibalizing” existing voice telephony services, especially since they are still working their way out of a period in which industry incumbents mindlessly spent hundreds of billions to expand the capacity of *existing voice networks*.

□ **“We Wouldn’t Want to Undermine TV!”** Similarly, cable companies might in principle seem well positioned to deliver high-quality video, audio, educational services, and interactive conferencing services on demand over broadband connections. But as a cable company executive told us recently, “When I tried to put a video on our Website, the old guard made me take it off – they are scared to death that broadband Internet will cannibalize digital TV’s pay per view and video-on-demand businesses!” Imagine what would have become of e-mail and chat if the US Post Office had exerted local monopolies over them! Or if print newspapers and magazines had controlled Web journalism! Or if, years earlier, Western Union had obtained a monopoly over telephone services, or Pony Express over Western Union.....

□ **International Exceptions.** International experience also supports the notion that the growth of broadband has been stimulated where there has been effective competition in the local loop. This has occurred in South Korea, where there has been stiff competition between DSL and cable service providers. On the other hand, where, as in Scandinavia, competition in the “local loop” is even more limited than it has been in the US, broadband penetration has also been limited – despite the fact that Scandinavian countries have the highest Internet penetration levels in the world.

❑ **“Walled Gardens.”** Nor have these dominant distributors been eager to open their closed distribution systems to new content providers for broadband or any other services. Under the unimaginative and interest-dominated “competitive” regimes administered by the FCC, these dominant players have been permitted to determine exclusively which content, programming, and services gets access to their networks. Indeed, with mixed success, they have used this market power to expand upstream into content production and network programming.

❑ **Supply-Side Bias.** As in the case of the wireless industry, the broadband industry has also become obsessed with capital-intensive expansions and the delivery of raw improvements in technical capacity – as if consumers want “more bandwidth” just for its own sake, independent of what it is good for. During the first few years of the bandwidth expansion, 1998-2000, as the pent-up demands of early adopters for “faster downloads” were satisfied, this approach appeared to work. But by now more and more users are wondering why they need so much bandwidth just to do email, order from Amazon, and update changes to the 5-10 websites they consult, on average, every day.

❑ **The Dearth of “Killer” Broadband Applications.** With so much industry power concentrated in the hands of non-software/ computer industry *rentiers* in the music, movie, cable and telephony industries, who reap most of their profits, not from innovations and new applications but increasingly from their lawyers’ and pocket-politicians’ abilities to defend and extend various monopsony rights, it is no accident that we are witnessing a decided decline in the rate of fundamental new IT-based innovations.

Nor does this have much to do with the dominance of Mr. Gates, though that certainly has not helped. After years of trying, Microsoft is still only a bit player in the global multimedia, entertainment, and educational content markets, and even less of a factor in the telephony, TV, and cable markets. XBox notwithstanding, Microsoft faces the challenge of its life as it sits across the table, not from its more or less civilized traditional rivals like IBM, Sun, and Cisco, but from “tough guys” in the cable, local telephony, wireless, and entertainment industries, many of whom cut their teeth on wheels, deals, and (in several leading cases) mafia connections.

❑ The key point here is that for the few months “après dial-up” it is neat to cruise the web more quickly, download emails and fat files at the touch of a button, and leave the thing connected all night long. But after a while the novelty wears off, you notice that you are not really visiting more than a handful of sites regularly anyway, you realize that the supply of genuinely interesting multimedia content on the web is really limited, and on the other hand, you see that your monthly connection charges have more than doubled and are continuing to rise. You may not go back to dial-up, but it will be very hard to sign you up for more bandwidth than you’ve got right now. And rather than secure multiple connections for family members, you are likely to get a wireless LAN access point and share one broadband connection with the whole family. (See below – new technologies.)

❑ **Killer VOIP ?** In this regard, some observers had hoped that really cheap “voice over the Internet” – over cable modems, DSL, or wireless – might be the ‘killer’ application that people have been seeking.

❑ However, at least so far, VOIP offers by broadband service providers have had disappointing reception by customer. As noted above, only about 21% of the country’s cable modem customers – about 2 percent of all cable customers -- have subscribed to integrated cable telephony so far. And all but a few thousand of those have actually been based on more expensive circuit-switched telephony, not packet-switched telephony – most industry observers expect no more than 100,000 packet-switched VOIP cable

monthly subscription fees of \$200. But it has nothing necessarily to do with promoting the broadband Internet. Indeed, quite the opposite – and as we saw above (p. 3), the number of IDTV subscribers has already outstripped the number of cable Internet subscribers in the US by more than two to one.

❑ **Limited Willingness to Pay.** For those broadband applications available today, those who have studied the “demand for bandwidth” rigorously have discovered a “very low willingness to pay for more bandwidth....given today’s set of applications.”¹² This is also consistent with the experience of wireless CLECs in the enterprise market, which found that few businesses had any use for more than 500 Kbps of bandwidth – and those that did were usually just sharing it among several office workers, substituting for multiple dial-up connections.

❑ **Price-Value Imbalance.** The other side of this equation is that -- as one might expect, given the absence of effective competition in most markets -- the average price for US broadband connections has risen sharply – for cable modem access, for example, by an average of 12% in 2001 alone, more than four times the rate of inflation, with DSL rate increases only slightly slower. This is consistent with the general pattern in cable rate increases, which have risen by more than 3 times the rate of inflation since 1996. Nor has this situation been helped by competitive trends in satellite Internet access – viz. EchoStar’s recent acquisition of its key direct competitor, DirectTV.

Combined with the dearth of compelling new broadband applications and content, it is no accident that the demand for broadband services is stagnating.

❑ **Increasing Low-End Competition.** Looking forward, all broadband technology vendors will also face greater competition at the “low end” of their data rates – for the (significant fraction of) customers who just want reliable, low-cost data connections. For example, as mobile wireless carriers move to 2.5G and 3G technologies, some of them are also expanding low-cost “semi-fixed” wireless services.¹³

Triumph of the Barbarians?

So here we are, supposedly the world’s technology vanguard, having hatched the Internet and driven its progress for more than two decades. Despite the technical potential of broadband Internet to deliver an unlimited supply of multimedia --- searchable, reproducible libraries of the world’s books, movies, audio collections, and photos, plus a plethora of interactive and educational services -- at nearly zero marginal cost to millions of homes, businesses, schools, nonprofits, and government agencies, the fact is that very few of these services have yet arrived. We have been invited to dinner and served pictures of food.

¹² See Hal R. Varian, “Estimating the Demand for Bandwidth,” University of California, August 29, 2000. <http://www.index.berkeley.edu>.

¹³ In July 2001, for example, Western Wireless launched a CDMA 1XRTT network in Terry, Montana, to serve 700 people spread over a 2 square mile area, targeting those needing not only higher-speed mobile data but also an alternative to dial-up Internet access. Data rates on the system average about 60 kbps, compared with actual average rates of about 28 kbps on (“old copper”) dial-up lines (using 56 k modems). Verizon and Sprint are now rolling out nationwide CDMA 1XRTT networks, based on Qualcomm technology. GPRS mobile data networks, the upgrades to TDMA and GSM networks now being introduced nationally by AT&T Wireless and Cingular, offer data rates that average closer to 30-35 kbps. All these mobile data rates can be tweaked significantly – for example, with 1.25 MHz of spectrum and two antennae on a modem, CDMA can manage an average throughput of 1.5 Mbps. And so called WCDMA or 3G mobile wireless networks, if and when they finally appear, should be capable of throughput on the order of 1-2 Mbps or more without tweaking.

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Even where it exists, the pipe is big, fat, and nearly dry – we are using megabit connections to deliver 10k emails, the moral equivalent of using the Concorde to deliver day-old bread crumbs to Parisian mice.

Now are there *really* a whole lot of nifty new broadband applications out there just waiting to be invented, beyond, say, moronic interactive violence and sex games? Is the whole broadband buzz just another case of Internet industry hype, in the great tradition of WAP?

What Is To Be Done?

Unfortunately there are no panaceas, given what we've argued is the deep-rooted structural basis of this problem.

□ **Legislative Fix?** Our Solons are at it again, trying to fix the problems discussed here with proposals that at least will help them solicit more hard dollars from rival industry interests. In this case the most recent effort is the so-called Tausin-Dingell Bill,¹⁴ introduced in 2001, and voted out of Congressional committee as we speak! This proposal is based on the rather odd notion that the root of the broadband problem has to do with severe supply-side constraints that were supposedly imposed on local Bell operating companies by the 1996 Telecommunications Act. Supposedly this act raised the cost of their supplying DSL services, by forcing them to resell their network services to independent ISPs and CLECs. That, in turn, supposedly limited their ability to compete with cable companies in offering broadband services.

In other words, by this logic, if we could only just *reduce* the amount of competition that the ILECs face from CLECs and ISPs, and also permit them to enter *long-distance* markets before local telephony markets are competitive, *local* broadband markets will become *more* competitive.

Fortunately this bill is given little chance of passing the US Senate – and not just for the obvious shortcomings in economic logic, but also because long-distance companies have more political clout there.

□ **Government Subsidies?** Technology industry mavens, realizing the potential far-reaching consequences if broadband fails to take off, have started to show real signs of desperation. On January 15, 2002 the industry group TechNet, a coalition of Silicon Valley companies, asked the Bush administration to establish a goal of getting 100-megabit-per-second broadband access into 100 million homes and businesses by the year 2010, supported by tax credits for consumers and small businesses.¹⁵

¹⁴ H.R. 1542, "The Internet Freedom and Broadband Bill of 2002." In a typical act of true bipartisan mindlessness and "industry donation mining," it was originally introduced in 1998 by the House Energy and Commerce Committee's chairman W. J. "Billy" Tausin (R-La.) and ranking Democrat John Dingell (D-Mich.)

¹⁵ There is of course a long-standing US tradition of having the Federal Government require or incent communications providers to provide "universal service." This was approach was applied to the US Post Office in the 19th century, and again to telephony in the early 20th century, as part of a deal that permitted AT&T to retain its private monopoly. Indeed, it is worth recalling how Theodore Vail, AT&T's first President, portrayed the the value of this approach in 1910, at a time when only about 10 percent of US householdes had telephone service:

(footnote continued)

The current administration, however, appears unlikely to get into the act of subsidizing broadband deployment directly – indeed, it has already cut back on the resources available to make high-speed Internet access available to rural areas and schools in poorer neighborhoods.¹⁶

□ **Regulatory Fixes?** The FCC, under its new “even more pro-free market than usual” Chairman Michael Powell, is also taking regulatory steps to free ILECs like Verizon and SBC from the requirement that they help independent ISPs and CLECS compete in the local broadband DSL services business. In Powell’s view, following Rep. Tauzin’s logic, this will somehow increase the amount of broadband competition in the local loop – despite the adverse “short-term” impacts on independent DSL providers and other ISPs. One might have thought a better alternative would have been to provide tougher penalties for ILECS (...all of them...) that fail to treat these independents on an arms-length basis, even while offering generally atrocious DSL service themselves. But that would be inconsistent with Powell’s ideology and Tauzin’s logic.¹⁷

□ **What the FCC *Might* Have Done.** The FCC might be able to accelerate the growth of broadband services and competition in the local loop, but only if it actually got tougher with regulation – by, for example, requiring cable companies and the ILECs to open up their networks to independent ISPs, so that new services could proliferate more easily. This is unlikely, given the “pro-incumbent” balance of forces in Washington.

□ **Other Regulatory Fixes?** Oddly enough, just as the FCC, Congress, and the White House have decided to place greater emphasis on so-called “free market” approaches to the broadband market, the media industry and the Congress are teeming up to increase the amount of intellectual property barriers to the use and dissemination of digital content. Arguably the best single broadband application to date was Napster, the Web site that facilitated the exchange of pirated audio recordings. But under pressure from the recording industry, this site has been closed down, and several other “peer-to-peer” sites have failed to fill its shoes. Professor Lawrence Lessig of Stanford Law School has proposed that rather than stiffen digital copywrite protection, the federal government should implement a mandatory 15 year license for the use of all existing content over the Internet, much as it provided the cable industry (for access to all TV programming) back in 1976. Given the current strength of the “enclosing” forces supporting digital rights enforcement, however, the outlook for this approach is gloomy.

□ **New Technologies?** The FCC Chairman does have another solution to the broadband stagnation and price-value problem up his sleeve. This is the notion that “new” wide-area broadband access technologies like terrestrial fixed wireless, higher-speed satellite or airborne, or power line broadband “soon gonna come” – e.g., that they

“The Bell system was founded on broad lines of "One System," "One Policy," "Universal Service," on the idea that no aggregation of isolated independent systems not under common control, however well built or equipped, could give the country the service. One system with a common policy, common purpose, and common action; comprehensive, universal, interdependent, intercommunicating like the highway system of the country, extending from every door to every other door, affording electrical communication of every kind from every one and every place to every one at every other place.” Cited in Herbert S. Dordick, "Toward a Universal Definition of Universal Service," Institute for Information Studies, Universal Telephone Service: Ready for the Twenty-First Century, 1991, p. 115 (hereafter, Dordick 1991).

¹⁶ President Bush’s proposed budget 2003, announced in February 2002, would eliminate the Technology Opportunities Program, a federal initiative aimed at bridging the “digital divide” through \$45 million in grants to state and local agencies and nonprofit groups.

¹⁷ See also the FCC proceeding announced February 14, 2002, determining that high-speed broadband internet service is an “information service,” with telephony components, rather than a “telecommunications service”

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will enter the US market fast enough and far enough to offer new competition to cable companies or telcos in the local loop.

The Chairman is certainly correct that several such technologies are, in principle, already available – and, indeed, that several new ones are on the horizon. In the terrestrial wireless arena, for example, companies like Worknet, Spike, Speedcom, Breezecom, and Proxim have already implemented public point-multipoint high-speed wireless services in unlicensed spectrum, offering up to 4-8 Mbps bidirectionally to their subscribers, using external antennas served from line-of-site base stations.

There are also LMDS and higher-speed technologies that are just now becoming available from companies like Soma and Nokia. These claim to eliminate line-of-site requirements and simplify provisioning, at least at some frequencies.¹⁸ Offshore, especially in Japan, Brazil, India, and several Central European countries, where the costs of laying fiber are especially high in urban areas, such fixed wireless approaches are already being adopted.¹⁹

Furthermore, it is also true that several other even more exotic wide-area broadband technologies involving satellites, high-altitude airplanes, power lines, metropolitan area Ethernet fiber rings for businesses,²⁰ and “fiber to the home” (“FTTP”)²¹ are also in various stages of development.²² And, on the broadband applications/ services side, there are also several interstartups that are focused on using spare network storage and processing to move music, movies and games across networks.²³

However, all these new technologies face some fundamental challenges on both the supply and demand side, at least in the US market – none of which really have to do with their purely technical merits. Focusing for the moment on fixed wireless, which has the greatest potential for establishing a national competitive alternative to cable or DSL, the following appears to be the fairly grim reality:

1. **Independent Ventures?** None of the wireless CLECs launched to date in the US market have prospered. Indeed, there have been several notable bankruptcies, including Winstar (whose \$5 billion of assets were acquired for \$200 million by IDT in December 2001), Teligent, Mobilstar, and Worknet.

¹⁸ In Soma’s case, for example, the non-line of sight capability is most clearly established in the neighborhood of 2.5-2.7 GHz. Whether or not this also works at 5.6 GHz is not clear. Line of site is much less of an issue in developing countries than in the US market.

¹⁹ NTT, for example, recently agreed to do a trial of Soma’s fixed wireless technology in 120 Tokyo households.

²⁰ One highly touted metropolitan Ethernet startup, Yipes, recently went bust.

²¹ Even in the current economic downturn, one finds isolated cases of these new technologies being deployed. In February 2002, for example, Central Texas Technologies announced that it will use optical technology from Alloptic to build FTTH and fiber-to-the-business networks in Crystal Falls, a 4,000-acre residential development now going up in Leander, Texas, beyond the service area of SBC, the LEC in that area.

²² For the high-altitude airplane approach, see www.halostar.com. Skybridge, another wireless broadband alternative, featured a plethora of low-altitude satellites.

²³ These include companies like Allcast, Blue Falcon Networks, Kontiki and CenterSpan Communications. CenterSpan recently announced a service contract with Sony Music Entertainment which makes it Sony’s main distributor of digital content, sending music and movies to Sony’s consumers.

The VC industry, so badly burned by such wireless ventures, is probably not disposed to fund a huge new independent wireless CLEC right now with the tens of millions that would be need to get off the ground.

2. Industry Partners?

- **Telco Sponsors?** One might have thought that “Inter-LATA” telcos like AT&T, Sprint, and MCI/Worldcom would have been more interested in the fixed wireless alternative, as a way of competing with the ILECs and minimizing local access charges and provisioning costs. However, AT&T Wireless disbanded its own fixed wireless group in October 2001, and AT&T Corp. and AT&T Broadband have never had much interest in it. Sprint and Worldcom/MCI acquired hundreds of US MMDS spectrum licenses in 1999-2000, and dabbled with fixed wireless pilots – by 2001, Sprint had launched MMDS service in 14 US markets, and Worldcom in 9. However, Sprint also put its MMDS roll outs on hold in October 2001.²⁴ While Worldcom has said it would continue to launch new MMDS services in four more markets in 2002, focused on business customers, its economic crisis makes all such plans doubtful.

- Indeed, if another new entrant interested in acquiring Worldcom’s MMDS 200 or more local market licenses for MMDS were to come along, it might listen to an offer. Again, however, we are skeptical that VCs would be willing to invest on the scale required for such a services startup right now.

- **ILECs?** The only scenario in which an ILEC might adopt a really aggressive fixed wireless rollout would be if they decided to compete for a combination of voice, Internet, and other services in territories where they don’t already offer local services. To date, ILECs like Verizon and SBC have been subject to legal constraints on competing outside their home territories. However, it is not clear that they would be interested in doing so even if permitted – so far they have also resisted competing with each other, preferring to merge instead.

- Furthermore, while fixed wireless might be easier to provision than DSL, which has been a nightmare for the ILECs, none appear to be very interested in cannibalizing their DSL businesses – especially now that they are on the verge of running the few remaining DSL independents (Covad, the leading one, is still losing money) out of town.

- **Cable Companies?** Cable companies have even less interest in fixed wireless. As we’ve discussed, they are focused on launching IDTV services and funding the huge capital costs involved in rolling them out. They’ve been quite happy to “milk” broadband Internet as a low-cost upgrade to cable, but they are not broadband pioneers. The only exceptions might be in certain rural areas of the country where fiber solutions are expensive, and where telcos or cable companies are under some political pressure to deliver universal broadband service.

3. **Content Industry Sponsorship?** One other long-shot ally that might support a new high-speed broadband alternative technology – though how much investment it would provide is really doubtful. Leading content providers like

²⁴ In October 2001, Sprint announced that it won’t expand its fixed wireless experiments to new markets until the next generation of new technology arrives.

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Disney have been known to complain about the fact that, in their view, the cable industry has been stifling the distribution of broadband content over the Internet. They have also been willing to support the growth of satellite pay per view services with reasonable content charges. Whether or not an alliance could be designed between a new independent, very high speed fixed wireless service provider and content providers would depend on the venture's detailed economics, as well as on the willingness of content providers to antagonize cable industry partners.

Mandatory Universal Broadband Service?

More recently, however, policymakers have backward from making broadband services, in particular, a "universal service."

5. Customer Demand? Even if there were the requisite industry sponsorship for such technologies, there is also our fundamental doubt, registered earlier, about the demand for new "even higher speed" wide-area broadband technologies -- unless they can deliver their services at *sharply lower incremental costs* -- below the marginal cash costs of operating the embedded fiber and DSL systems.

❑ As we noted above, business customers, especially, have found few applications that justify bandwidth above a few hundred Kbps per user. Certainly ordinary email, chat, and browsing, the meat and potatoes of business Internet use, do not. Even "shared white boarding" and real-time conferencing applications like Groove, WebEx, Centra, and Interwise don't require such bandwidth, either.

❑ Furthermore, even residential customers of video or audio downloads over the Internet may be able to get by with relatively low bandwidth. For example, new "offline" services like Tivo permit users to schedule heavy downloads or content backups at off-peak hours, and then access the cached local files at peak hours. This reduces the need for video streaming considerably.

So all these new technologies, while endlessly interesting, face huge practical barriers to adoption -- barriers that are far too high for them to exert much influence on the pricing and marketing strategies pursued by the dominant broadband providers in most key US markets.

Furthermore, as we've argued, most of the problem may not really be solvable by providing faster pipes alone. The fact is that apart from niche audiences like the gaming community, most Internet users today (a) are quite content with relatively low-speed email and browsing (b) don't find so-called "next gen" messaging applications like VOIP or video conferencing that cheap, useful, or reliable; (c) want broadband mainly to get *cheaper* access -- in the limit, free access -- to their favorite conventional video and audio content. And item (c) has for the foreseeable future been throttled by the market power of "old worlders" -- by the power of a handful of dominant cable, satellite, and telecommunications companies over broadband access, plus the power of a handful of dominant film, TV, and music companies over content.

For the foreseeable future, therefore, "the WWW (world wide wait)" is likely to continue for most Internet users in the US. The US market, in particular, will continue to account for a declining share of the world broadband access market -- and to be too small, on its own, to justify significant investments by application developers, content producers, software providers, and other technology vendors. Other countries may be able to fill the gap. But those of us who have been waiting patiently here for really high-speed wide area services that live up to the original intellectual, educational, and community development promised by "universal broadband" will probably just have to keep waiting or go elsewhere.

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