

OTHER COMPLETED RESEARCH

“Empirical Evidence on Efficiencies in the Common Ownership of Broadcast Stations.” With K. Anderson. Comments on FCC Proceeding, 1991.

“Do Government-Imposed Ownership Restrictions Inhibit Efficiency?” *Working Paper of the Bureau of Economics*, No. 169, 1988.

“Over-the-Air Television and Cable Prices: An Econometric Inquiry.” With M. Bykowsky. Served as basis of FCC decision deregulating cable prices, 1985.

“The Effect of Rate Regulation and Franchise Delay on Program Availability.” With D. Koran. Comments on FCC Proceeding, 1985.

“Pricing Flexibility and Consumer Welfare: The Deregulation of Basic Cable Rates.” NCTA White Paper, 1984.

“Economic Assessment of the Financial Interest and Syndication Rules.” With K. Anderson. Comments on FCC Proceeding, 1983.

“Domestic Fixed Satellite Transponders Sales.” Comments on FCC Proceeding, 1982.

An Analysis of Television Program Production, Acquisition, and Distribution. With R. Metzger. Network Inquiry Special Staff, Preliminary Report, Federal Communications Commission, June 1990.

“Production Abroad: Theoretical Considerations and Empirical Analysis.” Mimeo, 1978.

“Scale Economies in the Airline Industry: A Survey.” Mimeo, 1978.

PRESENTED PAPERS

“Market Structure, Program Diversity, and Radio Audience Size.” With R. Rogers. Meetings of the Western Economics Association, July 1993.

“The Effects of Rate Deregulation on Cable Subscribers.” With K. Baseman. Policy Approaches to the Deregulation of Network Industries: An American Enterprise Institute Conference, October 1990.

“Economic Analysis and Policy Implications of the Financial Interest and Syndication Rule.” Telecommunications Policy Research Conference, Airlie House, October 1990.

“The Design and Evaluation of Competitive Rules Joint Ventures for Mergers and Natural Monopolies.” With F. Warren-Boulton. American Economic Association Meetings, December, October, 1990.

“Do Media Ownership Restrictions Reduce Economic Efficiency?” Telecommunications Policy Research Conference, Airlie House, November 1989.

“The Conflict Between Spectrum Efficiency and Economic Efficiency.” With R. Rogers. Telecommunications Policy Research Conference, Airlie House, November 1989.



“Regulation versus Antitrust.” Annenberg Conference: The Divestiture Five Years Later, March 1989.

“Regulating Cable Television.” Telecommunications Policy Research Conference, Airlie House, September 1987.

“An Empirical Analysis of Television Program Prices.” With S. Besen and G. Fournier. Meetings of the Southern Economic Association, November 1981.

“Flexible Exchange Rates and Market Integration.” With B. White. Federal Reserve System Conference on Financial Market Research, June 1979.

“Advertising, Price Competition, Market Structure.” With A. Arterburn. Meetings of the Southern Economic Association, November 1978.

“The Effects of Exchange Rate Systems on International Capital Market Integration.” With B. White. Federal Reserve System Conference on International Research, November 1977.

OTHER PROFESSIONAL ACTIVITIES

Chair, “Competition between Cable Television and Telephone Companies.” Telecommunications Policy Research Conference, September 1991.

Discussant, “Competition and Ownership in the Media.” Telecommunications Policy Research Conference, September 1991.

Chair, “Spectrum Management Session.” Telecommunications Policy Research Conference, Airlie House, September 1988.

Book Review, *Productivity in the United States* by John Kendrick and Elliot Grossman, *Southern Economic Journal*, April 1981.

Discussant, “Deregulation of Telecommunications.” Meetings of the Western Economic Association, July 1981.

Referee, *Southern Economic Journal*, *RAND Journal of Economics*, Harvard University Press.

AWARDS

Award for Excellence in Economics (FTC), 1988.

Competition Advocacy Award (FTC), 1987.

Brookings Economic Policy Fellow, 1978–1979.

SUNY Faculty Research Grant, 1978.

NSF Traineeship, 1973–1974.

Finalist, Woodrow Wilson Fellowship Competition, 1971.



ATTACHMENT B

HIGH-SPEED INTERNET COMPETITION

December 2000

Prepared for the
National Cable Television Association

by
Broadband Intelligence, Inc.



7910 Woodmont Avenue
Suite 320
Bethesda, MD 20814
301-718-2028
(f) 301-718-9144
www.broadbandintelligence.com

TABLE OF CONTENTS

SUMMARY AND ANALYSIS	1
I. U.S. CABLE'S HIGH-SPEED GROWTH IN 2000	3
II. GROWTH IN THE DSL SECTOR DURING 2000.....	5
A. ILECs Show Growing Momentum with Third Quarter Gains.....	7
B. DSL Sales and Installations are Expected to Continue to Increase during the Fourth Quarter of 2000 and Through 2001	8
III. COMPARISON OF CABLE AND TELEPHONE COMPANY RESIDENTIAL HIGH- SPEED CUSTOMER GROWTH RATES: 1998 - 2001	11
IV. OTHER COMPETITORS IN THE HIGH-SPEED INTERNET ACCESS SECTOR.....	12
A. Satellite	12
1. StarBand.....	12
2. WildBlue	13
3. Hughes DirectPC and Spaceway	13
B. Terrestrial Broadcast High-Speed Internet Access Providers.....	14
<i>Geocast:</i>	14
<i>Iblast:</i>	14
<i>More Broadcast High-Speed Internet Access Providers on the Horizon:</i>	15
C. High-Speed Internet Access Wireless Providers	15
LMDS	15
MMDS	16
V. About Broadband Intelligence	17

HIGH-SPEED INTERNET COMPETITION SUMMARY AND ANALYSIS

During the first nine months of 2000, competition in the U.S. high-speed access-to-the-PC market intensified. At the same time, penetration of homes accessing the Internet via high-speed more than doubled from 1.6 million, or around 4.5% of all Internet households as of year-end 1999, to slightly more than 4 million high-speed connected households, representing around 9% of all Internet homes, as of September 30, 2000. Clearly, 91% of Internet homes still access the Internet via traditional dial-up service.

The battle to provide high-speed access to homes continues to grow more heated as cable operators, incumbent local exchange carriers (ILECs) and competitive data local exchange carriers (DLECs) deploy service across America. While cable continues to grow its high-speed broadband business, telephone companies are growing their broadband customer counts at a faster pace. As this paper will document, there are a number of factors that point to even faster growth in the DSL market next year.

Both cable operators and telephone companies are also facing increased competition from satellite, terrestrial broadcast and wireless providers in the provision of broadband service. New providers are poised to begin their own high-growth phases. Consumers increasingly have a choice among service providers offering high-speed access, a trend that will likely continue as even more broadband service providers, offering increasingly varied types of broadband packages and content, push penetration beyond the current small minority of high-speed Internet households.

The principal findings of this report are as follows:

- **Cable modem penetration grew rapidly during the past year and will likely accelerate its growth in 2001:** U.S. cable operators served 2.97 million cable broadband subscribers as of September 30, 2000, an increase of 117% over the 1.37 million cable high-speed subscribers served as of year-end 1999. Moreover, during the previous twelve months, cable's high-speed customer base increased 176%. The recent launch of self-installation technology along with upgraded cable facilities (allowing for wider availability of high-speed service) will likely speed up the penetration of cable modems in 2001.
- **DSL growth outpaced cable's rate of growth during recent months and is expected to grow at even faster rates during 2001:** The number of residential DSL customers grew from 295,710 at year-end 1999 to nearly 1.1 million as of September 30, 2000, reflecting a growth rate of 260%. Moreover, for the twelve months ending September 30, 2000, DSL's residential customer base increased a staggering 844%. Although cable accounted for virtually all residential broadband subscribers at the end of 1998, DSL's share of the broadband universe grew to 17% at the end of 1999, and could grow to 26% by the end of 2000 and 31% by the end of 2001.

Among the factors that are expected to speed up increased DSL penetration next year are the availability of self-install technology, continued DSL price cuts, increase in the number of serviceable DSL lines and the more widespread launch of bundled voice-DSL packages.

- **Other competitors are entering the high-speed Internet access market at an increasing rate:** Cable and telephone companies are not the only providers of high-speed Internet access. Among the new and well-financed entrants to the market are satellite companies StarBand, Wild Blue (formerly iSKY), DirecPC (providing services such as *AOL Plus*, *Juno Express* and Earthlink's Service "Powered by DirecPC"), terrestrial broadcasters Geocast, iBlast and Dotcast, along with existing wireless providers Winstar, Teligent, Sprint and MCI-Worldcom. These companies are already providing (or will soon provide) even greater high-speed access choices to American consumers.

I. U.S. CABLE'S HIGH-SPEED GROWTH IN 2000

Cable operators served 2.97 million cable high-speed Internet access subscribers at the end of the third quarter 2000, an increase of 117% over the 1.37 million cable high-speed customers reported at the end of 1999, and approximately 176% greater than the total number of such customers for third quarter 1999.

Reports from the publicly traded cable operators, which reflect over 90% of the U.S. cable subscriber universe, show that the rate of new installations continued at a rapid clip during the third quarter, and is expected to accelerate during the fourth quarter of this year. (See chart below.)

CABLE HIGH-SPEED ACCESS CUSTOMERS BY COMPANY					
(in million)	<u>9/30/99</u>	<u>12/31/99</u>	<u>3/31/00</u>	<u>6/30/00</u>	<u>9/30/00</u>
Adelphia	0.032	0.042	0.050	0.075	0.105
ATT*	0.114	0.207	0.279	0.689	0.888
Cablevision Systems	0.032	0.052	0.070	0.093	0.140
Charter	0.048	0.085	0.123	0.149	0.185
Comcast	0.116	0.142	0.195	0.237	0.304
Cox	0.140	0.187	0.260	0.320	0.399
Insight	0.000	0.003	0.012	0.019	0.024
MediaCom	0.000	0.000	0.002	0.004	0.007
MediaOne	0.172	0.220	0.297	0.000	0.000
TimeWarner	0.247	0.320	0.447	0.573	0.719
Others	0.175	0.110	0.150	0.175	0.200
Total	1.076	1.368	1.885	2.333	2.971
<i>Quarterly Change</i>	<i>33%</i>	<i>21%</i>	<i>27%</i>	<i>19%</i>	<i>21%</i>

* Includes MediaOne's high-speed customers as of June 30, 2000.

Source: Broadband Intelligence, Inc. analysis of company data and Broadband Intelligence, Inc. analysis 2000

Cable Self-Installation Initiatives Launch

During mid-2000, as the manufacturing of DOCSIS modems accelerated, the cable industry started to move away from proprietary, technician-reliant installations and made headway on its use of self-installs. As cable operators begin to sell the standards-based modems at retail to consumers, and adopt quicker less expensive installation methods, cable modem penetration is likely to grow at a quicker pace due to the decline in capital and labor expenses to operators.

The latest development concerned top broadband service provider Excite@Home when it unveiled its self-installation kit, called the Excite@Home Quick Start Kit, on October 17, 2000.¹ The kit contains a startup CD, an @Home user guide, an installation guide, necessary cable and connectors and other elements for allowing the customer to configure and start service right away. The kit is priced at \$29.95 and is available via cable operators and retail outlets, including Circuit City and CompUSA.

Cable's second largest broadband service provider, and largest cable operator, Road Runner and AT&T, respectively, have marketed their own self-install initiatives by tapping Austin, TX-based customer service and installation software company BroadJump, part of a new breed of self-install software players, to help their new customers in the installation process.²

Long Island-based cable operator Cablevision Systems, which also owns a New York metro area consumer electronics chain, The Wiz, has reported that almost 95% of its new cable modem subscribers sign on for the high-speed service using self-installation kits sold via The Wiz.³

¹ Excite@Home Gets Heavy with Self-Install, Customer Service Technology," Broadband Daily, (www.broadband-daily.com), Vol. 2., Issue #191, October 17, 2000 [Article ID: 356-1813].

² "BroadJump Expands Self-Install Deal with AT&T, Highlighting Cable's Catch-Up with Telcos," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #205, November 6, 2000 [Article ID: 370-1882].

³ "Cablevision Systems Stresses High-Speed Sub. Growth, Potential," Broadband Daily, (www.broadband-daily.com), Vol. 2, Issue #150, August 10, 2000 [Article ID: 315-1616].

II. GROWTH IN THE DSL SECTOR DURING 2000

ILECs and DLECs significantly expanded their markets during 2000 in rolling out high-speed Internet access services, particularly in the residential sector as standard ADSL (asymmetric DSL) modem technologies and self-installation options took hold. (See chart below.)

GROWTH IN DSL SUBSCRIBER COUNTS					
	<u>9/30/99</u>	<u>12/31/99</u>	<u>3/31/00</u>	<u>6/30/00</u>	<u>9/30/00</u>
ILECs					
<i>Verizon*</i>	10,000	30,000	62,000	220,000	350,000
Residential	6,000	21,000	49,600	176,000	280,000
Business	4,000	9,000	12,400	44,000	70,000
<i>BellSouth</i>	10,000	30,000	49,000	74,000	134,000
Residential	6,000	21,000	39,200	59,200	107,200
Business	4,000	9,000	9,800	14,800	26,800
<i>GTE</i>	35,000	57,000	88,000	-	-
Residential	24,500	45,600	70,400	-	-
Business	10,500	11,400	17,600	-	-
<i>SBC</i>	64,000	114,900	201,000	399,000	516,000
Residential	22,400	91,920	160,800	319,200	412,800
Business	41,600	22,980	40,200	79,800	103,200
<i>Qwest (U S West)</i>	70,000	110,000	136,000	175,000	213,000
Residential	49,000	88,000	108,800	140,000	170,400
Business	21,000	22,000	27,200	35,000	42,600
<i>Broadwing (Cin. Bell)</i>	-	17,800	24,000	29,000	34,000
Residential	-	14,240	19,200	23,200	27,200
Business	-	3,560	4,800	5,800	6,800
ILEC Total	189,000	359,700	560,000	897,000	1,247,000
Residential	107,900	281,760	448,000	717,600	997,600
Business	81,100	77,940	112,000	179,400	249,400

* Verizon's totals include GTE DSL customers as of June 30, 2000.
(continued on next page)

**GROWTH IN DSL SUB.
COUNTS**

(cont.)

DLECs	<u>9/30/99</u>	<u>12/31/99</u>	<u>3/31/00</u>	<u>6/30/00</u>	<u>9/30/00</u>
<i>Covad</i>	31,000	57,000	93,000	138,000	205,000
Residential	3,100	8,550	18,600	27,600	41,000
Business	27,900	48,450	74,400	110,400	164,000
<i>NorthPoint</i>	11,800	23,500	41,300	62,000	87,300
Residential	1,180	3,525	8,260	12,400	17,460
Business	10,620	19,975	33,040	49,600	69,840
<i>Rhythms</i>	6,700	12,500	20,000	31,000	47,000
Residential	670	1,875	4,000	6,200	9,400
Business	6,030	10,625	16,000	24,800	37,600
DLEC Total	49,500	93,000	154,300	231,000	339,300
Residential	4,950	13,950	30,860	46,200	67,860
Business	44,550	79,050	123,440	184,800	271,440
Grand Total	238,500	452,700	714,300	1,128,000	1,586,300
Residential	112,850	295,710	478,860	763,800	1,065,460
Business	125,650	156,990	235,440	364,200	520,840
% Quarterly Gain	103%	90%	58%	58%	41%
Residential	100%	162%	62%	60%	39%
Business	105%	25%	50%	55%	43%

Source: Broadband Intelligence, Inc. analysis of company data and Broadband Intelligence, Inc. analysis © 2000. Residential DSL subscribers estimated based on research showing that ILECs have experienced a growing proportion of residential DSL customers culminating in 80% of the ILEC DSL base composed of residential customers as of 9/30/00. Conversely, DLECs serve primarily business customers, culminating in 80% of the DLEC DSL base composed of business customers as of 9/30/00.

Indeed, the growth in the residential DSL market has outstripped growth in the commercial DSL market throughout 2000 and outpaced growth in the overall DSL market. According to our analysis, the total number of DSL subscribers served by the major ILECs (Verizon, BellSouth, SBC, Qwest) and Broadwing and major DLECs (Covad, NorthPoint and Rhythms) grew almost 565% during the twelve months ending September 30, 2000, escalating from 238,500 to 1,586,300. However, the number of residential DSL customers grew by 844% over the same time period, rising from 112,850 as of September 30, 1999 to 1,065,460, as of September 30, 2000, with quarterly gains of 162%, 62%, 60% and 39% over the relevant

quarters, respectively. Indeed, in just the first nine months of 2000, residential DSL increased 260%, from 295,710 to 1,065,460.

A. ILECs Show Growing Momentum with Third Quarter Gains

A review of third quarter 2000 DSL operational statistics issued by the ILECs shows that the top telephone companies are gaining momentum in signing up new DSL customers. SBC's third quarter report showed a DSL subscriber count of 516,000, up by 117,000 over second quarter levels, highlighting the company's push to capture more of the high-speed sector.⁴ And SBC's DSL picture is improving: SBC reported that as of mid-October, it had a daily add-on rate of 4,000, which could accelerate during the fourth quarter as the company's neighborhood gateways, which expand the reach of DSL, commenced operations. (See discussion on page 9.)

SBC expects to expand its service, including DSL service, in 30 metro markets outside its traditional service area. The company has already launched service in four outside region markets, including Boston, Seattle, Miami and Ft. Lauderdale, and plans to begin marketing efforts in eleven additional outside markets soon.

Bell South also significantly increased the number of Bell South DSL customers, making its biggest quarterly jump since the company launched the high-speed option in the third quarter of 1999.⁵ BellSouth ended the third quarter this year with 134,000 primarily residential DSL customers, up from the 74,000 at the end of the second quarter of 2000. BellSouth expects to end 2000 with 200,000 DSL subscribers. Moreover, Bell South recently projected that it would triple its DSL customers in 2001.

Verizon reported a huge leap in the number of DSL customers to 350,000 up 130,000 during the quarter.⁶ Verizon was installing 3,500 new DSL customers per day as of mid-October and is confident it will reach its year-end goal of 500,000 subscribers. Verizon ended the quarter with more than 1,770 central offices equipped for DSL, and nearly 60% of its total access lines qualified for the high-speed service.

Qwest issued its third quarter report showing a total of 213,000 DSL customers, a jump of 38,000 during the quarter, (and a three-fold increase over third quarter 1999), signaling that the company is on track to meet its year-end target of 250,000 DSL subscribers.⁷ Besting its plan to reach 72 markets with DSL service by year-end, Qwest reached that goal at the end of the third quarter.

⁴ "SBC Rockets Past 500K DSL Mark," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #196, October 24, 2000 [Article ID: 361-1836].

⁵ "Earnings Stream Grows to Flood During Sweeping Market Rally," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #194, October 20, 2000 [Article ID: 359-1831].

⁶ "Earnings Update: Verizon Steams with 130K DSL Sub. Gain; Choice One, Nucentrix," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #201, October 31, 2000 [Article ID: 366-1863].

⁷ "Qwest, Excite@Home, NTL Post Broadband Gains," Broadband Daily, (www.broadband-daily.com) Vol. 2, Issue #197, October 25, 2000 [Article ID: 362-1841].

B. DSL Sales and Installations are Expected to Continue to Increase during the Fourth Quarter of 2000 and Through 2001

- **Telephone Companies Prepare to Meet Increased Demand:** Most telephone companies are reacting to increased consumer demand for DSL by adding key personnel to their workforce. In particular, SBC has reported that it has increased the number of technicians assigned to DSL activation and has tripled the number of sales representatives trained on DSL orders. Likewise, DLECs are deploying technology that enables better remote control, testing and management of DSL copper loops, therefore speeding up service activation and cutting down on technician-reliant installs.

- **Self-Install Option Takes Hold:** Another major factor propelling SBC's late-year DSL install increase is the full-fledged advent of self-installation technology. SBC reported that from mid-September to mid-October 2000, over half of its new DSL customers opted for the quicker self-installation options.⁸

Likewise, Verizon reported in its third quarter report that 90% of its new DSL customers hook themselves up, helping to fuel the company's 130,000 DSL subscriber gain during that quarter.

Qwest, which weighed in with a net gain of 38,000 new DSL customers during third quarter, reported that 90% of its customers self-installed.

BellSouth began to offer its self-installation options in selected markets in September and expect this to play a significant role in improving their ability to roll out DSL service in the future.

- **DSL Prices Continue Dropping:** DSL providers are also moving swiftly to close the pricing gap between cable and telephone company high-speed Internet access services. At the outset of the year, cable high-speed Internet access service averaged \$40 to \$42 per month, while most residential DSL service packages began at \$49.95 to \$59.95/mo.⁹

From July through September, Verizon cut its lowest-priced ADSL service to \$39.95 per month from \$49.95 per month. In early October, BellSouth began offering ADSL service for \$40/month for customers that also buy a higher-end voice package, throwing in a free modem, free installation and a free month of service.

⁸ "BroadJump Expands Self-Install Deal with AT&T, Highlighting Cable's Catch-Up with Telcos," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #205, November 6, 2000 [Article ID: 370-1882].

⁹ "Self-Installs, Price Cuts Lower Consumer Cost of Residential DSL," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #127, July 10, 2000 [Article ID: 292-1507].

In conjunction with DSL partner Prodigy, SBC offered a promotion package that included DSL service, a DSL-equipped Compaq PC (valued at over \$1,000) for a monthly fee of \$59.95/mo. for 28 months, plus \$89 upfront charge for shipping and handling.¹⁰ Customers ordering this package between September 1, 2000 and October 31, 2000 were not billed for service until January 2001.

In each of these instances, telephone companies have dropped prices in order to offer consumers a more attractive (and competitively-priced) product.

- **The number of DSL serviceable lines is expected to increase:** As technology has improved and new system configurations get put in place, the number of lines capable of being served by DSL is expected to increase. SBC, for example, will deploy neighborhood gateways that will allow the company to deploy DSL on lines fed by digital loop carriers (previously not viable for DSL), and bring DSL customers to within 12,000 feet of a DSLAM and increase minimum guaranteed rates to 1.5 Mbps for a much larger portion of its customers.¹¹ Following a September 8, 2000 approval of its gateway plans, SBC announced plans to deploy 4,000 such gateways by year-end, boosting to 18 million the number of customers that will have access to DSL. By the end of 2002, SBC plans to have 18,000 gateways deployed, making DSL available to more than 80% of its customers.

In addition, DSL technology providers are working to expand the reach of ADSL services in an effort to serve more homes around any given telephone company's central office. For example, San Jose, CA-based telecom and service provider network enhancement solution company Symmetricom announced on November 7, 2000 that its GoLong extender system supports the delivery of ADSL services as far as 30,000 feet from the central office, and supports high-speed data rates of 1.5 Mbps downstream and 128 kbps upstream, extending the theoretical reach of DSL beyond the current limitation of 13,000 to 14,000 feet.

- **Voice over DSL will launch more widely:** Yet another factor that is likely to help DSL service providers gain even greater market share is growth in the availability of voice-over-DSL (VoDSL) services. VoDSL standards have been adopted by DSL providers and enable the cost-effective delivery of multiple voice lines plus high-speed Internet access over a single DSL connection. Most ILECs and DLECs plan to launch to both the residential and business markets low-cost bundled packages of voice and high-speed Internet access services.

Although best known for its long distance and wireless services, Sprint has initiated a plan to offer DSL services to 33 markets nationwide, branded as Sprint ION service. As of

¹⁰ "SBC Slashes DSL Prices, Promotes Compaq PC Deal," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #162, September 5, 2000 [Article ID: 327-1675].

¹¹ "SBC to Test DSL Enhancing Broadband Gateways," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #157, August 28, 2000 [Article ID: 322-1653].

October 2000, Sprint has launched DSL service in 24 top markets and counts as one of its competitive advantages the sale of bundled multiple phone lines with DSL service.¹²

Offered to both businesses and homes, Sprint's least expensive bundled package includes two voice/fax lines, 400 minutes of long distance service, and 1.5 Mbps downstream high-speed Internet service for \$44/mo. Sprint's most expensive package is priced at \$149.99 and includes four voice/fax lines with enhanced features such as voice mail and caller ID plus 750 minutes of domestic long distance, along with high-speed access that offers up to 8 Mbps downstream/1 Mbps upstream.

¹² "Sprint Gets Closer to 33% National DSL Coverage with Spate of Launches," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #188, October 12, 2000 [Article ID: 353-1795].

III. COMPARISON OF CABLE AND TELEPHONE COMPANY RESIDENTIAL HIGH-SPEED CUSTOMER GROWTH RATES: 1998 - 2001

Cable's early lead in the provision of high-speed Internet access eroded during 2000, a trend that is likely to continue during 2001. Our analysis shows that total high-speed access subscriptions, both cable and telephone companies, stood at 530,000 at the end of 1998, but could grow to 5.7 million by the end of 2000. If recent run rates, as well as individual corporate projections hold true throughout 2001, total high-speed access customers could reach 12.1 million by the end of next year. (See table below).

CABLE AND TELCO HIGH-SPEED RESIDENTIAL CUSTOMER GROWTH Yearend 1998 - 2001 (in million, except %)

	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
Total high speed access subscriptions	0.53	1.70	5.70	12.10
Total net new high speed	0.53	1.17	4.00	6.40
Cable				
Basic cable subscribers	66.3	67.5	68.7	69.7
Total cable homes passed	95.6	96.6	97.6	98.6
Percent cable homes passed also passed by high-speed	20%	30%	49%	53%
Total cable HP also passed by HSA	19	29	48	52
Cable HSA Subs. % HSA Homes Passed	3%	5%	9%	16%
Total cable HSA subs.	0.50	1.40	4.20	8.40
Net new cable HSA subs.	0.50	0.90	2.80	4.20
Telco				
Homes Offered DSL Service	8.0	16.0	25.0	36.7
% Homes Offered DSL	7.9%	15.6%	24.2%	35.2%
Internet Homes Offered DSL	1.76	4.68	10.89	22.19
DSL Residential Subs. % Homes Offered DSL	0%	2%	6%	10%
DSL Residential Subs. % Internet HH Offered DSL	0%	1%	3%	6%
Total DSL Residential subs.	0.03	0.30	1.50	3.70
Net new DSL Residential subs.	0.03	0.27	1.20	2.20
<i>Total DSL Residential subs. % of total high-speed subs.</i>	<i>6%</i>	<i>17%</i>	<i>26%</i>	<i>31%</i>
<i>Net new DSL Residential subs. % of total net new high-speed</i>	<i>6%</i>	<i>23%</i>	<i>30%</i>	<i>34%</i>

Source: Broadband Intelligence, Inc. analysis © 2000.

On a net gain basis, the total number of high-speed customers grew by 530,000 during 1998 and 1.17 million during 1999. Our estimates for year-end 2000 show a net gain in new

broadband customers of 4 million, while 2001 could yield an additional 6.4 million new high-speed PC-based subscribers.

While virtually all (94%) of the total broadband subscriber base was attributable to cable at the end of 1998, DSL's share of the broadband universe grew to 17% at the end of 1999. DSL could account for 26% of all U.S. high-speed subscribers by the end of 2000, a figure that is likely to rise to 31% by the end of next year.

Likewise, DSL accounts for an increasing percentage of net new high-speed customers, with only 6% of new broadband subscribers falling into the telephone company category at the end of 1998, but 23% of new broadband customers opting for DSL by the end of 1999, a ratio that could climb to 30% by the end of 2000 and 34% by the end of 2001.

IV. OTHER COMPETITORS IN THE HIGH-SPEED INTERNET ACCESS SECTOR

A. Satellite

Although formerly thought of as a one-way downstream provider of video programming, satellite technology is starting to play a key role in high-speed Internet access competition. Most major communications satellite companies have on their drawing boards plans to launch next generation satellites capable of interactive communications, most notably high-speed Internet access. The next generation of Ka-band satellites is slated for launch during the next two years. However, competitive pressure from satellite provision of high-speed Internet access has begun to occur before Ka-band satellites are even launched. Satellite's ability to make major inroads over the past few years into the video programming distribution market helps to situate it well for the provision of high-speed Internet access.

1. StarBand

The most notable entrant into high-speed Internet access market is McLean, VA-based StarBand, which launched its Ku-band, two-way satellite broadband service on November 6, 2000.¹³ Created by Israel-based VSAT (very small aperture technology) satellite company Gilat, StarBand is selling its \$60/mo. service at 30,000 outlets (7,000+ RadioShacks and 23,000 partner EchoStar distributor locations) to potential customers, who must have a clear view of the Southern sky in order to receive the service.

Backed by not only EchoStar (DBS Dish Network distributor), which has taken a \$50 million stake, but also software giant Microsoft (which also has a \$50 million share in StarBand), the company is offering high-speed Internet access service that at 500 kbps is significantly faster

¹³ "StarBand Officially Launches Two-Way Broadband Satellite Service," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #206, November 7, 2000 [Article ID: 371-1888].

than traditional dial-up access, but still slightly slower than cable modems and most DSL options. StarBand is, however, offering a multicast service that broadcasts popular consumer content, including video content, at speeds up to 10 Mbps.

2. WildBlue

EchoStar is also backing another high-speed satellite service company, Denver, CO-based WildBlue (formerly known as iSKY). EchoStar will also lend retail help to WildBlue's Ka-band service via its RadioShack and other outlets once the company's service has launched.¹⁴

WildBlue plans to launch its first broadband access satellite, WildBlue I, during the first quarter of 2002, kicking off 1.5 Mbps high-speed service throughout the U.S., Canada and in most Latin American countries.

3. Hughes DirectPC and Spaceway

Hughes Network Systems is the parent of another satellite broadband service provider, DirecPC, an Internet access arm of Hughes-owned direct broadcast satellite service company DirecTV. DirecPC offers a higher speed (400 kbps) service that is dependent on telco return technology for upstream communications. DirecPC is dependent on customer purchases of \$299 dishes, not including the \$100 to \$200 installation charges.

Due to the telephone company return, limited-speed, higher cost nature of DirecPC, we estimate that roughly 100,000 customers have signed up for the service since its late-1998 launch. However, this number can be expected to grow as the Dulles, VA-based Internet service giant America Online made a \$1.5 billion investment in Hughes in June 1999, with the goal of pumping up AOL's satellite broadband prospects.¹⁵ The joint Hughes-AOL broadband service, called *AOL Plus*, launched on October 25, 2000.¹⁶ The service allows AOL customers an enhanced interactive service by providing everything a member needs to get AOL with the faster speed of DirecPC.

AOL is not the only ISP looking to use the DirecPC platform. On July 10, 2000, Hughes Network Systems entered into an agreement to deliver Juno Online Service's *Juno Express* (Juno's high-speed broadband service) via DirecPC.¹⁷ Similarly, Hughes announced on November 15, 2000, that it had entered into an agreement with Earthlink to offer high-speed

¹⁴ "WildBlue Files for IPO," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #186, October 10, 2000 [Article ID: 351-1782].

¹⁵ "AOL Invests \$1.5 Bil. in Hughes to Jump Start DirecPC," Broadband Daily, (www.broadband-daily.com), Vol. 1, Issue #41, June 22, 2000 [Article ID: 41-188].

¹⁶ "AOL Pushes Broadband Agenda Forward with Launch of DirecPC Service, AOL 6.0," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #198, October 26, 2000 [Article ID: 363-1847].

¹⁷ "Juno Hops on DirecPC Platform," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #130, July 13, 2000 [Article ID: 295-1519].

satellite Internet services "Powered by DirecPC." This agreement expands Earthlink's broadband coverage and offers them the ability to offer broadband service nationwide.

Hughes will also be entering the two-way high-speed satellite-delivered market within two years. Hughes is planning its own Ka-band service, *Spaceway*, which will launch in late 2001 (or early 2002). *Spaceway* will provide bandwidth-on-demand allowing customers to use (and pay for) the amount of bandwidth needed for specific applications.

B. Terrestrial Broadcast High-Speed Internet Access Providers

Geocast:

Menlo Park, CA-based start-up Geocast was formed in late 1999 with a plan to use portions of terrestrial digital broadcasters' digital spectrum for the delivery of broadband content to PCs equipped with a custom-designed box called the GeoBox. The Geocast broadband platform for PC users offers the instant availability and clarity of television with the customization and interactive features of the Web. This will provide users with instant access to their own personalized selection of locally and nationally sourced information, entertainment, and e-commerce offerings, including downloadable software and music. The company's goal is to provide popular content that typically requires lengthy downloads for faster delivery, charging premium fees or subscription surcharges.

Geocast is backed by a group of top TV station owners including Hearst-Argyle, Belo and Albritton Communications. Consumer electronics providers Thomson and Royal Philips Electronics are also backing Geocast along with Liberty Media, Electronic Arts, Mayfield Fund and Kleiner Perkins Caufield & Byers.

On October 16, 2000, Geocast declared its distribution platform neutrality by signing a deal with satellite company EchoStar, under which EchoStar will deliver Geocast's interactive broadband service to PC users, starting third quarter 2001. While specific programming plans are not in place, Geocast plans to orient its satellite service to more heavily broadband content, with its terrestrial option tilting more toward the delivery of local content.¹⁸

iBlast:

Los Angeles, CA-based broadband broadcast company iBlast announced its launch on March 7, 2000 with a plan to use TV broadcasters' digital spectrum for the delivery of free high-speed Internet access services to user PCs. Among the company's backers are leading broadcast station owners including Tribune, Gannett, Cox, The Washington Post Company, Scripps,

¹⁸ "Geocast's Echostar Deal: Geocast Not Just for Terrestrial Broadcasters Anymore," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #191, October 17, 2000 [Article ID: 356-1812].

Meredith Corp., Media General, Lee Enterprises, The New York Times Company, McGraw Hill, Smith Broadcasting and Northwest.¹⁹

Collectively these companies own 143 local TV stations in 102 markets, covering more than 80% of all U.S. homes and all of the top 25 media markets. The companies have contributed portions of their digital spectrum, a cash investment and guaranteed marketing commitment.

iBlast plans to launch service in early 2001, offering low-cost or free high-speed delivery of music, video, games, software and other content programmed by other parties. Unlike Geocast, which is designing a special, relatively high-cost box to provision its services, iBlast will work with digital TV tuners attached to or built into PCs. The estimated cost of an individual tuner is \$20.

More Broadcast High-Speed Internet Access Providers on the Horizon:

A number of other broadband broadcast companies are in the start-up stage. One of the latest: Palo Alto, CA-based Dotcast announced November 6 that it has raised investments from top tier companies, including the Walt Disney Company, GE Capital, Quantum Corp. and Worldview Technology Partners, who join Dotcast initial investors Intel Capital and Angel Investors.²⁰ Dotcast plans to use a combination of terrestrial digital broadcast spectrum and satellite-backend distribution to multicast content to users at high-bandwidths.

C. High-Speed Internet Access Wireless Providers

Two basic kinds of broadband wireless technologies have been deployed in the U.S.: Local multipoint distribution service (LMDS), which operates in the 28 GHz to 38 GHz range and multichannel multipoint distribution service (MMDS), which operates in the 2.5 GHz spectrum. Each technology is aimed at different segments of the broadband market, with LMDS exclusively offered to the business market, and MMDS primarily provided to residential subscribers.

LMDS

LMDS service providers, led by New York, NY-based Winstar and Vienna, VA-based Teligent, typically offer bundled services of competitive local voice service and high-speed access service to offices in buildings where deals have been made with the building owners or landlords. While LMDS providers have posted impressive gains in 2000 (Winstar reported access to 13,100 buildings as of September 30, 2000 and counted 920,000 total lines installed and Teligent reported 4,142 on-net buildings and 433,997 lines installed as of the same date),

¹⁹ "Broadcasters Back iBlast's Broadband Delivery Service," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #46, March 8, 2000 [Article ID: 208-1064].

²⁰ "Other Broadband Developments," Broadband Daily (www.broadband-daily.com), Vol. 2, Issue #206, October 7, 2000 [Article ID: 371-1895].

their commercial market focus place them out of the residential high-speed Internet access competitive fray.

MMDS

MMDS operators, on the other hand, are focused squarely on the residential market, using the frequencies formerly reserved for the delivery of multichannel video to delivery high-speed Internet access to homes within the line of sight of the networks' transmitters and receivers. Long distance, wireless and local telephone company Sprint is the leader in delivering two-way MMDS high-speed Internet access service, spearheading the launch of wireless high-speed services following the FCC's approval of return-path communications for MMDS providers in September 1998.

Sprint has launched two-way high-speed access marketed under the brandname *Sprint Broadband Direct*, in a number of key markets, including Denver, Boulder and Colorado Springs, CO, Phoenix and Tucson, AZ, Detroit, MI, Houston, TX and San Jose and Oakland, CA. As of September 30, 2000, Sprint was already serving approximately 10,000 high-speed Internet access customers with its fixed wireless technology.²¹

NextNet Wireless unveiled in November a new system that resolves line-of-sight problems -- this system could dramatically expand the reach of MMDS systems within their markets. NextNet has begun testing this technology in Waseca, MN and Sprint has signaled its intention to deploy NextNet's architecture.

The other key player in the U.S. MMDS market is Sprint rival MCI-Worldcom -- together the two companies own the bulk of MMDS licenses in the U.S. Worldcom has kicked off market tests of its new two-way technology in Boston, Jackson, MS and Baton Rouge, LA, and on November 15, 2000, rolled out service in Memphis, TN. Worldcom plans to roll out its fixed wireless high-speed Internet access service in 30 markets by year-end 2001.²²

²¹ See "MCI-Worldcom, Sprint in \$129 Bil. Merger; Broadband Cited as One Main Goal," *Broadband Daily*, (www.broadband-daily.com), Vol. 1, Issue #105, October 6, 1999 [Article ID: 107-522] and "Sprint Kicks Off Wireless Broadband in Phoenix," *Broadband Daily* (www.broadband-daily.com), Vol. 2, Issue #89, May 12, 2000 [Article ID: 253-1309] and "Sprint's Lackluster Quarter Fails to Impress," Powered for *Broadband Daily* by the451.com (www.broadband-daily.com), Vol. 2, Issue #192, October 18, 2000 [Article ID: 357-1819].

²² "MCI Test in Boston Heralds the Beginning of New Broadband Service," *Broadband Daily* (www.broadband-daily.com), Vol. 2, Issue #64, April 3, 2000 [Article ID: 226-1164].

V. ABOUT BROADBAND INTELLIGENCE

Broadband Intelligence Inc. (BI) is a broadband media research and publishing company that delivers analysis of the rapidly growing and increasingly important broadband technology area. Located in Bethesda, MD, BI provides high-level, strategically valuable analysis and data on the high-speed Internet, digital set-top and packet switched telephony worlds exclusively. BI publishes Broadband Daily (www.broadband-daily.com), the first daily Internet and fax publication devoted to news and analysis of the broadband businesses and Broadband Wire (www.bbandwire.com) a comprehensive site devoted to breaking news and wire stories related to broadband.

BI's President and Principal Analyst is Cynthia Brumfield, who is a widely recognized and quoted expert on the broadband world. Ms. Brumfield founded BI in 1999 after having served as a senior analyst at leading media research and analysis firm Paul Kagan Associates. While at Kagan, Ms. Brumfield led consulting projects for major media and technology clients and was the senior analyst on many Kagan newsletters, including Cable TV Technology, Interactive Television, Internet Media Investor and others. Ms. Brumfield also led high-profile seminars for Kagan, including several on broadband data to the PC and TV and interactive television.

Prior to joining Kagan, Ms. Brumfield spent ten years as the Vice President of Research and Policy Analysis at the National Cable Television Association, where she was responsible for tracking, analyzing and reporting upon media business and policy developments affecting the cable industry. Before joining NCTA, Ms. Brumfield was the Director of Research for The Media Institute, a nationally recognized non-profit media organization.

CERTIFICATE OF SERVICE

I, Gretchen M. Lohmann, do hereby certify that I caused one copy of the foregoing Comment of NCTA to be served by hand to all parties listed below, on this 1st day of December, 2000.

Johanna Mikes
Common Carrier Bureau
445 12th Street, S.W.
Room 5-C163
Washington, D.C. 20554

Christopher Libertelli
Common Carrier Bureau
445 12th Street, S.W.
Room 5-C264
Washington, D.C. 20554

Carl Kandutsch
Cable Services Bureau
445 12th Street, S.W.
Room 3-A832
Washington, D.C. 20554

Douglas Sicker
Office of Engineering & Technology
445 12th Street, S.W.
Room 7-A325
Washington, D.C. 20554

Robert Cannon
Office of Plans & Policy
445 12th Street, S.W.
Room 7-B410
Washington, D.C. 20554

International Transcription Service, Inc.
445 12th Street, S.W.
Room CY-B402
Washington, D.C. 20554

