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January 15, 1999

Ex Parte

Ms. Magalie R. Salas, Secretary
Federal Communications Commission
445 12th Street, S.W.
Room TWB204
Washington, DC 20554

Re: Notification of Permitted Ex Parte Presentations –
CC Docket No. 98-146

Dear Ms. Salas:

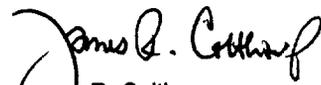
Pursuant Section 1.1206(a)(1) and (a)(2) of the Commission's Rules, Comcast hereby submits an original and one copy of this letter and enclosure regarding permitted ex parte presentations in the above-referenced docket. On Thursday, January 14, Brian Roberts, Joe Waz and Jim Coltharp of Comcast Corporation met with:

- Commissioner Gloria Tristani & Paul Gallant, Legal Advisor
- Commissioner Harold Furchtgott-Roth, Paul Misener, Sr. Legal Advisor & Kevin Martin, Legal Advisor
- Chairman Kennard, & Tom Power, Sr. Legal Advisor
- Commissioner Susan Ness, Anita Wallgren, Sr. Legal Advisor & Linda Kinney, Legal Advisor
- Commissioner Michael Powell, Jane Mago, Sr. Legal Advisor & Kyle Dixon, Legal Advisor

to discuss the Commission's review of broadband deployment and Section 706 issues. Attached to this notice is a two-page handout that summarizes the issues discussed in the meeting, and a packet of further handouts provided during the meeting.

Please contact the undersigned with any questions.

Sincerely,


James R. Coltharp
Senior Director, Public Policy

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cc: Commissioner Tristani, Paul Gallant, Commissioner Furchtgott-Roth, Paul Misener, Kevin Martin, Chairman Kennard, Tom Power, Commissioner Ness, Anita Wallgren, Linda Kinney, Commissioner Powell, Jane Mago & Kyle Dixon

(w/encl.)



COMCAST: Deployment of Advanced Telecommunications Capabilities

Comcast Corporation:

- Nation's fourth largest cable operator: 4.3 million customers in 21 states.
- 314th on FORTUNE 500 listing.
- \$4.912 billion in revenues (1997).
- 17,600 employees.
- Comcast Cellular: PCS service to over 800,000 customers in PA, NJ, DE and MD. Wired local exchange service in FL and MD, and long-distance service in 14 states.

High-Speed Internet services:

- Seven markets reaching over 865,000 residential customers.
- Comcast@Home now has 30,000 customers.
- Comcast invested \$1.48 billion in past three years to upgrade cable systems.
- Cable modem markets: Baltimore, MD; Sarasota, FL; Philadelphia, PA; Chesterfield, VA; Union, NJ; Suburban Detroit, MI; Orange County, CA.

The marketplace is already moving to deploy advanced telecommunications services:

- Cable companies are marketing cable-delivered high-speed Internet services.
- Data-oriented CLECs are deploying xDSL-based high-capacity loops.
- Teledesic building \$9 billion space-based network
- Qwest and Level 3 each building \$3 billion networks
- Interexchange carriers are increasing the capacity of their interstate fiber networks, with announcements by Sprint ION network and AT&T INC network.
- Internet backbone providers are deploying new high-speed routers to serve as gateways.
- Broadband wireless providers are using newly acquired spectrum to deliver high-bandwidth local loops to end-users.
- DirecPC, offered by Hughes downloads Internet data at 400 kilobits/second to subscribers at home or office. Other satellite services, such as Celestri, can be effective in rural and remote areas.
- Any shortage of backbone or last mile capacity is a transitory issue that the market is solving, so no Commission action under Section 706 is warranted.

Congressional Intent of Section 706:

- The policy goal of Congress is to ensure the deployment of "advanced telecommunications capability" in "a reasonable and timely fashion."
 - If the market is not leading to reasonable and timely deployment, Section 706 itself does not grant the Commission independent authority, but rather directs use of existing Title II authority to accomplish certain goals.
 - Even if a grant of authority is assumed, any Commission action must lessen, not increase, the regulatory burdens on current and potential providers of advanced services.
-

"America Online and Bell Atlantic Form Strategic Partnership for Provide High-Speed Access for the AOL Service," America Online and Bell Atlantic Company Press Release, 1/13/99.

"Ameritech to Invest \$3 Billion in Capital Expenditures for Communications Networks During 1999," Ameritech Company Press Release, 1/13/99.

"Dell, GTE Collaborate for easy Internet Access on Dell PCs," Dell Company Press Release, 1/11/99.

"Frost & Sullivan – The Race is on for High-speed Data Contenders: Are You at the Front of the Bandwidth Race?" Frost & Sullivan Company Press Release, 12/7/99.

"Got Bandwidth? Pacific Bell Answers California's 'Need for Speed' with \$39 ADSL Service, Major Availability," Pacific Bell Company Press Release, 1/12/99.

"Level 3 Communications to Install 10-12 Conduits in 16,000 Mile Inter-City Network," Company Press Release, 1/12/99.

"Lucent to Buy Ascend Communications," by Noelle Knox, AP Business Wire, 1/13/99.

"Qwest Significantly Expands Network," Qwest Company Press Release, 1/7/99.

"RCN to Provide High-Speed Internet, Phone and Cable Services to Boston-Area Town of Watertown, Agreement Marks RCN's 12th Local Approval in Boston Market," RCN Company Press Release, 1/8/99.

"RCN Obtains Critical Cross-County Fiber Internet Backbone," RCN Company Press Release, 1/12/99.

"SBC Seeks to Dominate High-speed Web Access," by Simon Hirschfeld, Reuters, 1/12/99.

"SNET to Begin ADSL Trial in Connecticut," SNET Company Press Release, 1/12/99.

"Teledesic Applauds Launch of Iridium's Global Phone Service," Teledesic Company Press Release, 11/2/98.

"Teledesic Moves Toward Space-Based Net," by Kevin Maney, USA Today, 2/27/98.

"The Orbiting Internet: Fiber in the Sky," by John Montgomery, BYTE Magazine, November 1997.

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Wednesday January 13, 10:14 am Eastern Time

Company Press Release

SOURCE: America Online, Inc. and Bell Atlantic

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America Online and Bell Atlantic Form Strategic Partnership to Provide High-Speed Access for the AOL Service

DSL Upgrade Begins Rolling Out This Summer to AOL Members

Bell Atlantic High-Speed Technology Available in Areas Covering 14 Million Homes by End of Year 2000

DULLES, Va. and NEW YORK, Jan. 13 /PRNewswire/ -- America Online, Inc. (NYSE: AOL - news), the world's leading interactive services company, and Bell Atlantic (NYSE: BEL - news) today announced a strategic alliance to provide high-speed Digital Subscriber Line (DSL) access to the AOL service.

In a significant step for the development of broadband availability, America Online this summer will start to offer Bell Atlantic's Infospeed DSL access as a premium upgrade for AOL members in Bell Atlantic's service area, as the technology becomes available in major markets.

To support this multi-year agreement, Bell Atlantic plans to make its DSL technology available in areas covering 7.5 million homes by the end of 1999, a number that Bell Atlantic expects to nearly double to more than 14 million by the end of the year 2000.

This DSL feature will provide AOL members with high-speed bandwidth to their personal computers over existing telephone wires. At a typical speed of up to 640 kilobits per second, DSL access will be more than 20 times faster than the standard 28.8 kbps modems.

In addition to high-speed access, AOL members who take advantage of the DSL option will:

- Gain "always on" access to AOL, as no dial-up is required for DSL users because they are always connected;
- Be assured of consistently high-speed access because DSL dedicates a broadband connection to

- each individual user;
- Benefit from "AOL Anywhere," the features of which include enabling broadband users to also connect to AOL when they are not at home;
- Experience broadband-enhanced multimedia and other services; and
- Be able to use their computer and telephone or fax simultaneously on a single phone line.

America Online will be announcing DSL pricing when the roll out begins this summer, but the DSL upgrade is expected to cost AOL members less than \$20 extra per month.

AOL also intends to offer a special version of the AOL software that will provide DSL users with links to a customized Bell Atlantic Web site with information on the company's products and services. The companies are planning other co-marketing directed to AOL members with DSL access. In addition, Bell Atlantic will have opportunities to offer AOL members certain optional telecommunications products and services.

James G. Cullen, president and chief operating officer of Bell Atlantic, said, "This first of its kind alliance with America Online demonstrates Bell Atlantic's commitment to becoming consumers' first choice for high-quality, high-speed data services. We're creating a mass-market model for the millennium that adds value for our customers and our company. Combining AOL's marketing clout, convenience and ease-of-use with Bell Atlantic's technological leadership will provide even more momentum to the interactive medium."

Bob Pittman, President and Chief Operating Officer of America Online, said: "This strategic partnership with Bell Atlantic, one of the world's great telecommunications companies and an industry leader in this groundbreaking DSL technology, ensures that our members will be among the first to have the opportunity to benefit from high-speed connections. This announcement marks an important advance in our commitment to offer affordable and convenient broadband access to those AOL members seeking faster connection speeds."

Mr. Pittman added: "America Online has always been committed to embracing all new technologies and features that offer our members a full range of options to enhance their online experiences. With our industry-leading membership base, we're excited about the prospect of helping to build economically viable markets for broadband technologies. With our Bell Atlantic partnership and other alliances in the future, we together can begin to make the promise of broadband a reality for mass market consumers."

About Bell Atlantic

Bell Atlantic is at the forefront of the new communications and information industry. With more than 42 million telephone access lines in New England, New York and the Middle Atlantic states and more than eight million wireless customers worldwide, Bell Atlantic companies are premier providers of advanced wireline voice and data services, market leaders in wireless services and the world's largest publishers of directory information. Bell Atlantic companies are also among the world's largest investors in high-growth global communications markets, with operations and investments in 23 countries.

About America Online

America Online, Inc., based in Dulles, Virginia, is the world's leader in branded interactive services and content. America Online, Inc. operates two worldwide Internet services: America Online, with

more than 15 million members; and CompuServe, with approximately 2 million members. America Online, Inc. also operates AOL Studios, a leading builder of Internet brands for new market segments. Other branded Internet services operated by America Online, Inc. include AOL.COM, the world's most accessed Web site from home; Digital City, Inc., the No. 1 branded local content network and community guide on AOL and the Internet; AOL NetFind, AOL's comprehensive guide to the Internet; AOL Instant Messenger, an instant messaging tool available on both AOL and the Internet; and ICQ, an instant communication and chat technology on the Internet.

This press release contains forward-looking statements within the meaning of the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995. These statements address the timing of deployment, availability, new technology and pricing and benefits of DSL service. The forward-looking statements are based on management's current expectations or beliefs and are subject to a number of uncertainties and other factors (and uncertainties) that could cause actual results to differ materially from those described in the forward-looking statements. See AOL's Annual Report on Form 10-K, 10-Q's and other public filings for additional information.

SOURCE: America Online, Inc. and Bell Atlantic

More Quotes and News:

- [America Online Inc \(NYSE:AOL - news\)](#)
- [Bell Atlantic Corp \(NYSE:BEL - news\)](#)

Related News Categories: [computers](#), [internet](#), [ISDEX](#), [telecom](#)

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Wednesday January 13, 12:30 pm Eastern Time

Company Press Release*SOURCE: Ameritech*

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Ameritech to Invest \$3 Billion in Capital Expenditures for Communications Networks During 1999

Infrastructure Investments, Impact on Midwestern Economy Detailed

CHICAGO, Jan. 13 /PRNewswire/ -- Building on its record as the Midwest's leading investor, Ameritech (NYSE: [AIT](#) - [news](#)) plans to invest \$3 billion in capital in its communications networks in 1999. Customers' needs for communications services are at an all-time high, and these investments will enable Ameritech to meet rising demand for all types of communications services.

"No company invests more to bring leading-edge communications services to customers in the Midwest," said Tom Richards, Ameritech executive vice president. "Our \$3 billion investment represents a 50 percent increase compared with just five years ago, as we deepen our commitment to the Midwest."

About \$2 billion will be targeted at enhancing the company's core communications networks with half of the total supporting data networks. An additional \$1 billion will be devoted to infrastructure to provide wireless communications, cable TV, security monitoring, advanced data and Internet services.

"The days when a customer relied on the communications network only to make a phone call are over," Richards added. "Today, customers want and expect to make calls from phones without wires, receive TV programming from cable, send e-mail messages around the world and access the Internet -- and they want these services in the blink of an eye."

Joining Richards to announce the company's 1999 investment plans was Ameritech Network Services President Zie Rivers. Rivers noted that Ameritech deployed more than 200,000 miles of fiber-optic cable in 1998 to bring it closer to customers' homes. The company also constructed hundreds of self-healing, highly reliable fiber Synchronous Optical Network (SONET) rings in major metropolitan areas and between communities, and it invested \$600 million in new digital central office switches to transfer phone calls.

"We're committed to meeting the needs of customers -- fast speeds, additional lines and secure, reliable connections," Rivers said. "In a very real sense, we're the construction crew that's building and maintaining the information superhighway."

Ameritech's core communications network now includes:

- more than 1.7 million miles of fiber-optic cable, with an additional 300,000 miles of fiber expected to be deployed in 1999. Fiber optics now reach within two miles of 95 percent of customers' homes and businesses in Ameritech's service areas, which provides customers higher speeds and more reliable service;
- digital central office switches that now handle more than 90 percent of phone traffic;
- more than 1,000 SONET rings to improve reliability;
- 40 Asynchronous Transfer Mode (ATM) switches, which process high-speed data and voice calls as part of a family of 200 high-speed switches, some of which transmit messages by breaking the information into data packets to then send it along the network via different routes before re-assembling for the end user;
- 40 points of presence where business customers can connect to the high-speed network that Ameritech's advanced data services operates.

"Customers are using high-speed data connections as fast as we can build them," Rivers said.

"Internet and overall data traffic has doubled every year the past few years." Rivers also said that Ameritech will separate some data traffic away from voice traffic as early as the second quarter of 1999, in order to improve network efficiency and reliability.

"We've also boosted the capability of our NAP -- the Internet Network Access Point -- to handle even faster speeds. By mid-year, the NAP will likely be to the Internet as what O'Hare is to airports -- the busiest in the world," Rivers predicted.

Richards pointed out that capital expenditures are only one part of Ameritech's \$9 billion economic commitment to Midwestern communities. He noted that:

- company payroll is one of the largest in the region at \$2.7 billion;
- purchases, including network equipment, totaled \$5.5 billion;
- Ameritech paid more than \$1 billion in property, sales use, gross receipts, franchise and state income taxes in 1998;
- contributions from the Ameritech Foundation in 1998 were more than \$26 million to 5,026 educational, civic, cultural, and health and human services groups;
- more than 13,000 Ameritech employees and retirees contributed over 300,000 volunteer hours to more than 3,200 projects.

"When you add it all up," Richards emphasized, "Ameritech's annual economic contribution in the Midwest is more than \$9 billion. That's a substantial commitment and a standard we expect to continue."

Ameritech (NYSE: [AIT](#) - [news](#)) serves millions of customers in 50 states and 40 countries. Ameritech provides a full range of communications services including local and long-distance telephone and data, cellular, paging, security, cable TV, Internet and more. One of the world's 100 largest companies, Ameritech (www.ameritech.com) has 71,000 employees, 1 million shareowners and more than \$29 billion in assets.

SOURCE: Ameritech

More Quotes and News: [Ameritech Corp \(NYSE:AIT - news\)](#)

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Monday January 11, 11:59 am Eastern Time

Company Press Release

Dell, GTE Collaborate for Easy Internet Access on Dell PCs

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Dell Expands ConnectDirect Program with Internet Services from GTE.net

ROUND ROCK, Texas--(BUSINESS WIRE)--Jan. 11, 1999--Dell Computer Corporation (Nasdaq:[DELL](#) - [news](#)), the world's leading direct computer systems company, and GTE Internetworking today announced they will collaborate to integrate GTE.net's Internet access service into Dell Dimension® desktop PCs for home and small business customers, enabling Dell customers to choose GTE as their access provider when they log onto the Internet.

This announcement is the latest milestone in Dell's ConnectDirect(sm) strategy to provide its customers fast, easy and personalized Internet access through alliances with leaders in the online community.

"Most of our customers cite Internet access as a primary reason they're buying a PC," said Paul Bell, senior vice president and general manager of Dell's Home and Small Business Group. "We want Dell customers to be able to get onto the Internet within five minutes of turning on one of our machines."

"Our relationship with Dell is just another way that GTE is working toward providing customers with complete solutions," said Alex Coleman, vice president and general manager of online services for GTE Internetworking, a division of GTE Corp. (NYSE:[GTE](#) - [news](#)). "The ConnectDirect program distribution channels will enable GTE to continue to reach the growing population of today's most Internet-savvy consumers with our GTE.net service offerings."

The Dell and GTE offering provides Dimension customers with free Internet access for 30 days or 100 hours and two e-mail accounts. No credit card is required until day 31 or hour 100; after this free trial period, many payment plans are available, the average one providing unlimited access for \$19.95 per month.

About ConnectDirect

ConnectDirect is Dell's strategy to provide customers with easy, fast and personalized Internet access by offering a choice of best-in-class Internet services. Currently the ConnectDirect program includes alliances with AT&T WorldNet and GTE to provide Internet access services, with America Online to provide Internet access as well as access to AOL content, and with Excite to provide customized

Internet content and a portal to the Internet.

The program also includes alliances with Bell Atlantic, SBC Communications and US WEST for ADSL services in various areas throughout the United States. Dell has also selected Cisco Systems Inc. as the modem provider of choice for ADSL-ready Dimension PCs sold to US WEST customers.

About Dell and Dimension PCs

Dimension is Dell's award-winning line of desktop PCs for home and small business customers. The build-to-order PCs have led the industry in a number of technology developments, including the rapid transition to Intel® Pentium® II processors. For more information about Dimension desktop PCs, visit Dell's Internet site at www.dell.com/products/dim.

Ranked No. 125 among the Fortune 500 companies and No. 363 in the Fortune Global 500, Dell Computer Corporation is the world's leading direct computer systems company, based on revenues of \$16.8 billion for the past four quarters. Dell designs, manufactures and customizes products and services to customer requirements and offers an extensive selection of software and peripherals. Information on Dell and its products can be obtained through its toll-free number 800/388-8542 or by accessing the Dell World Wide Web site at www.dell.com.

About GTE Internetworking

GTE Internetworking, a unit of GTE Corporation (NYSE:[GTE](#) - [news](#)) offers customers, from consumers to Fortune 500 companies, a full spectrum of integrated Internet services using IP networking technologies. GTE Internetworking delivers complete network solutions, including dial-up and dedicated Internet access, high-performance Web hosting, managed Internet security, network management, systems integration and Web-based application development for integrating the Internet into business operations.

GTE.net, the dial-up Internet access provider for GTE Internetworking, was launched in the summer of 1996. GTE.net currently has over 600 nationwide local points of presence and services over 800,000 dial-up accounts.

GTE Internetworking draws upon its expertise in funded research and development of advanced technologies, including satellites, digital radio, multigigabit routers, security and speech, and GTE's strong existing telecommunications services, including local and long distance, wireless, paging, video and Internet.

GTE is one of the world's largest telecommunications companies and a leading provider of integrated voice, video and data services. More information about GTE Internetworking and GTE Corp. can be found on the Internet at <http://www.gte.com>.

Dell and Dimension are registered trademarks and ConnectDirect is a service mark of Dell Computer Corporation. Dell disclaims any proprietary interest in the marks and names of others.

Contact:

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Marci Grossman, 512/728-3113
marci_grossman@dell.com



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Monday December 7, 8:03 am Eastern Time

Company Press Release

SOURCE: Frost & Sullivan

Frost & Sullivan - The Race is on for High Speed Data Contenders: Are You At the Front of the Bandwidth Race?

MOUNTAIN VIEW, Calif., Dec. 7 /PRNewswire/ -- Explosive growth in Internet services, surging demand for high-bandwidth applications, and the rising number of telecommuters are driving the expansion of wireline high-speed data services. Digital subscriber line (xDSL), cable modem and T1/T3 connections are gaining popularity as communications grow more sophisticated and strain traditional connections.

According to new strategic research from Frost & Sullivan (www.frost.com), U.S. Wireline High-Speed Data Service Markets: xDSL, ISDN, Cable Modem, and T1/T3, the market generated \$14.9 billion in revenues in 1997. Technological improvements have made it possible for voice, data and video to be transmitted all at the same time.

"Carriers are becoming aggressive in their efforts to provide these combined services because they are the 'hot ticket' items for the future," says Frost & Sullivan Telecommunications Industry Analyst Agatha Poon. "With deregulation of the telecommunications industry, more and more companies are looking to capture the profits in this lucrative market."

For purposes of this study, the market has been segmented into: xDSL, cable modem, integrated services digital network (ISDN) and T1/T3 data services market. The xDSL services market is further segmented into high-bit rate digital subscriber line (HDSL), asymmetrical digital subscriber line (ADSL), symmetrical digital subscriber line (SDSL) and very high-bit-rate digital subscriber line (VDSL) market. The ISDN services market is further segmented into Basic Rate Interface (BRI) and Primary Rate Interface (PRI) services market. T1/T3 services are further segmented into full T1/T3 and fractional T1/T3 services markets.

There are over sixty companies that provide various types of data services analyzed in U.S. Wireline High-Speed Data Service Markets: xDSL, ISDN, Cable Modem, and T1/T3. These include the ILECs and the CLECs. Of these, the RBOCs and IXC are the dominate players in the market place. Competition between these players is not very significant as they operate in different regions and provide different services. The main competition exists between the various data technologies that the

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GTE	64 11/16	+1 5/8
LBTYA	47	-1 5/16
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companies provide.

"The deregulation of the telecommunications industry has led to a growing number of new players also competing within the data services market," says Frost & Sullivan Telecommunications Industry Analyst Neha Jhaveri. "Additionally, these competitors are striving to become exclusive suppliers of multiple communications services through bundling packages of data and voice services."

The U.S. xDSL, cable modem ISDN, and T1/T3 data services market is growing rapidly as the new xDSL and cable modem technologies begin to attract a growing number of customers. Demand from customers is pushing carriers to put additional investments into upgrading their infrastructure in order to satisfy the customers' needs. Capital investment for the development of advanced technologies will reap fruitful results for all types of service providers.

Frost & Sullivan gives out Market Engineering awards to the U.S. xDSL, Cable Modem, ISDN, and T1/T3 Data Services equipment industry to recognize companies that have worked hard to make a positive contribution to the market. These awards are based on Frost & Sullivan's telecommunications research and consulting work in this industry in 1997. Winners are selected from an in-depth analysis of the market competitors and interviews with those companies that make up the industry.

The 1998 Market Engineering Competitive Strategy Award was bestowed upon Tele-Communications Inc. [Nasdaq:[LBTYA](#) - [news](#)], Comcast, and Cox for their ability to implement an effective competitive strategy integrating the strategic elements of product, price, marketing and sales. Through their investment in @Home Network, these three cable companies have participated in the development of an advanced network architecture which supports connections that are hundreds of times faster than traditional telephone lines.

The technologies reviewed include asymmetric digital subscriber line (ADSL), asynchronous transfer mode (ATM), bandwidth, broadband, crosstalk, digital subscriber line, ethernet, frame relay, integrated services digital network (ISDN), interoperability, multiplexing, packet switching, rate adaptive asymmetric digital subscriber line (RADSL), single-pair digital subscriber line (SDSL), synchronous optical network (SONET), and very-high-speed digital subscriber line (VDSL).

Market participants include: Adelphia Communications, ALLTEL Corporation, America Online, Ameritech Corporation [NYSE:[AIT](#) - [news](#)], AT&T, Bell Atlantic Corporation [NYSE:[BEL](#) - [news](#)], BellSouth Corporation [NYSE:[BLS](#) - [news](#)], Brooks Fiber Properties, Inc., Cablevision Systems Corporation [AMEX:[CVC](#) - [news](#)], Cable and Wireless, Inc., CADVision Development Corporation, Century Communications, Century Telephone Enterprises, Inc., Cincinnati Bell Telephone Company, Citizens Telecom Company, Comcast Corporation [Nasdaq:[CMCSA](#) - [news](#)], Covad Communications, Cox Communications, Cyber Access Internet Communications, Electric Lightwave, Elkhart Telephone Company, Frontier Corporation [NYSE:[FRO](#) - [news](#)], GTE Corporation [NYSE:[GTE](#) - [news](#)], HarvardNet Internet Services, IBM Global Network, ICG Communications, Inc., InterAccess Company, Intermedia Communications, InterMedia Partners, ISDN-NET, Inc., Jones Intercable, LCI International, Lenfest Group, Loretto Telephone Company, Inc., Marcus Cable, MCI Communications Corporation, McLeod USA, Inc., MediaOne, Network Access Solutions, NorthPoint Communications, Inc., Northwest Iowa Telephone Company, OGI Telecomm, OneNet Communications, Inc., ORCONET, Prime Cable, RCN Corporation [Nasdaq:[RCNC](#) - [news](#)], Rhythms NetConnections, SBC Communications, Inc., Signet Partners, Inc., Socket Internet Services, Southern New England Telephone (SNET), Sprint Corporation [NYSE:[FON](#) - [news](#)], TDS Telecommunications Corporation, Tele-Communications Group, Teleport Communications Group Time Warner, Inc., TLGnet, U.S. Long Distance Corporation, US WEST Communications, and WorldCom

This telecommunications industry research has integrated the Market Engineering consulting philosophy into the entire research process. Critical phases of this research included: Identification of industry challenges, market engineering measurements, strategic recommendations, planning and market monitoring. All of the vital elements of this system help the market participants navigate successfully through the telecommunications market.

Frost & Sullivan is an international marketing consulting company that monitors the telecommunications industry for market trends, market measurements, and strategies. This ongoing research is utilized to update a series of research publications such as #2096-63 U.S. Utility Telecommunications Service Markets and to support industry participants with customized consulting needs. Free executive summaries of all Frost & Sullivan reports are available to the press.

Report: 2001-63 Date: December 1998 Price: \$3450

SOURCE: Frost & Sullivan

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- Bell Atlantic Corp (NYSE:[BEL](#) - [news](#))
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Tuesday January 12, 10:50 am Eastern Time

Note: there is a subsequent correction for this article.

Company Press Release

SOURCE: Pacific Bell

Related Quotes

DELL	79 11/16	-3/4
SBC	55 3/16	+1 7/16
delayed 20 mins - disclaimer		

Got Bandwidth? Pacific Bell Answers California's 'Need for Speed' With \$39 ADSL Service, Major Availability

Lightning-Fast ADSL Enables Californians to Make the Most of the Internet

SBC Announces Largest Deployment of ADSL in the United States

SAN FRANCISCO, Jan. 12 /PRNewswire/ -- The wait for affordable super-fast access to the Internet is over for millions of California households and small businesses. Pacific Bell announced today it is reducing prices on its popular high-speed Internet access service and making it available to millions more of its customers throughout the Golden State.

In a related announcement today, Pacific Bell's parent company, SBC Communications, Inc. (SBC), announced plans for the largest rollout of Asymmetrical Digital Subscriber Line (ADSL) service in the country. By the end of 1999, SBC intends to provide ADSL service from 526 central offices to 8.2 million residential and 1.3 million business customers. In California, Pacific Bell will almost triple its current deployment of ADSL, providing service in central offices that serve 70 percent of its customers by the end of the year.

Pacific Bell plans to offer "always on" ADSL service with guaranteed minimum connection speeds -- which enables users to connect to the Internet at speeds up to 200 times faster than today's conventional 28.8 Kpbs modems -- for as low as \$39 a month. In addition, Pacific Bell and Pacific Bell Internet Services will offer ADSL service and Internet access packages for as little as \$49 per month. ADSL equipment and installation will be available for as little as \$198. These new, attractive price points represent a decrease of 45 percent for ADSL service and Internet access, and 34 percent for ADSL installation and equipment.

See attachment for specific pricing details.

By reducing its cost and boosting deployment, Pacific Bell is making high-speed Internet access a viable option today for millions of households and small businesses who are looking for greater bandwidth to make the most of the Internet or to connect to the office network from home. Pacific Bell will invest more than \$100 million in 1999 to upgrade its ADSL technology and equip 255 central offices with the service. Pacific Bell estimates that as many as 5 million residential and 900,000 business customers will qualify for ADSL service from the 255 central offices.

"Got bandwidth? For the vast majority of Americans, the answer is still no," said Ed Mueller, president and CEO of Pacific Bell. "Fortunately for Californians, Pacific Bell is answering the Golden State's 'need for speed' by undertaking the country's largest single-state deployment of ADSL service and making it substantially more affordable. Now, Californians can surf the web and connect to the office at quicksilver speeds for less than the cost of taking a family of four to the movies."

"We are confident ADSL service from Pacific Bell will become the high-speed Internet access of choice for California. We're putting ADSL within reach of millions more Californians so that customers will get great value, superior service, all the speed they need and transport provided over the highly-reliable Pacific Bell network," added Mueller.

With the \$39 per month ADSL service, Pacific Bell's customers can simultaneously use a phone or fax machine while getting downstream connection speeds up to 1.5 Mbps and an upstream connection speed of 128 Kbps -- 50 times faster than today's most common 28.8 analog modems.

Downstream through-put speeds will vary depending on the customer's distance from the central office and other factors, but the connection speed will be at a guaranteed minimum of 384 Kbps. Pacific Bell estimates 75 percent of its customers qualifying for ADSL will get downstream connection speeds of 1.5 Mbps.

For customers demanding higher speeds, Pacific Bell and Pacific Bell Internet Services will offer a package with downstream connection speeds of up to 6 Mbps, and an upstream connection speed of 384 Kbps. Downstream connection speeds will be guaranteed at a minimum of 1.5 Mbps.

In addition to downloading data, graphics, audio and video, ADSL's speed transforms e-commerce transactions by creating faster responses for on-line traders and buyers, faster information exchanges between business partners and faster on-line sales. And the e-commerce explosion is just beginning. In fact, Deloitte & Touche predicts a four-fold increase in e-commerce during the next two years.

ADSL: A Better Broadband Solution

With today's announcement, more than half of Pacific Bell's customers will be able to subscribe to lightning-fast ADSL service by the end of the year. This is crucial because industry insiders estimate 35 percent of the nation's Internet traffic begins and ends in California. Add that to the fact more than 3.7 million Pacific Bell households are anticipated to be online by the year 2000, and you have the start of a "big" bandwidth revolution, explained Mueller.

When compared to cable modems, ADSL ensures greater reliability, better security and more consistent speeds, experts say, because the service is delivered via a dedicated line from a central office to the individual user's home or office. In addition, Pacific Bell's ADSL runs on the Pacific Bell network, one of the most reliable in the world. And customers choosing Pacific Bell Internet Services, surf on one of the country's most sophisticated Internet backbones and benefit from award-winning service and support.

Because cable modems depend on shared bandwidth among a group of users, accessing the Internet via cable modem is a "floating crap game," said Amy Wohl, Wohl Associates, a market research company. "If you're using it for telecommuting, there would be some places where not too many people are home during the day and you'd be fine. And there would be other places where you're sharing it with three elementary schools and 42 other telecommuters, and it will be terrible."

For example, Andrew Abbate, a computer consultant with a Bay Area start-up company, has his home hooked to Pacific Bell's ADSL. When telecommuting, Abbate values the service's security so he can conduct on-line banking and download massive audio and video files. In recent months, Abbate also used ADSL to design an interactive Web site and build a virtual private network.

"ADSL has changed the way I work and communicate via the Internet," said Abbate. "Thanks to Pacific Bell's ADSL, the World Wide Web is no longer the World Wide Wait."

Pacific Bell believes the demand for ADSL will soar now that the service is widely available and affordable. In fact, DataQuest, a market research company, predicts the number of ADSL subscribers could zoom from 50,000 now to 5 million worldwide by 2002.

ADSL Update

SBC also announced plans today to offer ADSL service to millions of its customers in Texas, Missouri, Oklahoma, Kansas and Arkansas by the end of 1999, and will begin ADSL trials in Connecticut later this month.

The company has also completed joint initiatives with Dell Computer Corp. [[Nasdaq:DELL - news](#)] and Compaq Computer to promote more convenient access to ADSL.

"We are moving aggressively to provide the advanced high-speed data services customers throughout our territory are demanding," said Edward E. Whitacre Jr., SBC chairman and CEO. "We are committed to ADSL technology and to building the multi-media corridor to homes and businesses that will enable people to change the way that they work, learn, shop and play."

Whitacre said that SBC is filing tariffs today with the Federal Communications Commission for regulatory clearance to offer ADSL to customers in all five Southwestern states.

Pacific Bell launched ADSL service in May 1998. By Sept. 1998, the company had completed ADSL deployment in about 90 California central offices, making the service available to more than 1.6 million residential customers and 400,000 business customers throughout the Golden State.

"One reason Pacific Bell is deploying this technology so rapidly in California is the favorable regulatory environment established by the California Public Utilities Commission (CPUC)," said Jim Callaway, President, External Affairs Pacific Telesis. "The CPUC has instituted fair guidelines which make it attractive for us to make the major capital investments necessary to bring this important technology to millions of the residents of this state."

Committed to making bandwidth widely available, Pacific Bell is making it easy for Californians to get ADSL service. For example, the company has signed agreements with more than 22 ISPs -- which act as authorized sales representatives for Pacific Bell's ADSL service and offer the service to their business and residential customers. In addition, Pacific Bell will continue making ADSL service

available to competitors and Internet service providers for resale at the new prices.

For more information on Pacific Bell ADSL and to order the service, California residents can call 1-888-884-2DSL or visit the Pacific Bell Web site at <http://www.pacbell.com/products/business/fastrak/adsl/>.

Pacific Bell is a company of SBC Communications Inc. (NYSE:SBC - news; <http://www.sbc.com>), a global leader in the telecommunications industry, with more than 36.9 million access lines and 6.5 million wireless customers across the United States, as well as investments in telecommunications businesses in 11 countries. Under the Southwestern Bell, Pacific Bell, SNET, Nevada Bell and Cellular One brands, SBC, through its subsidiaries, offers a wide range of innovative services. SBC offers local and long-distance telephone service, wireless communications, data communications, paging, Internet access, and messaging, as well as telecommunications equipment, and directory advertising and publishing. SBC has approximately 129,000 employees and its annual revenues rank it in the top 50 among Fortune 500 companies.

Pacific Bell ADSL Pricing Sheet

Downstream connection rates of up to 1.5 Mbps, guaranteed at 384 Kbps, 128 Kbps upstream

	Monthly Service (1- Year or Longer Term)	Customer Premise Equipment	Equipment Installation	ADSL Service Installation	Month-to-Month Service
Pacific Bell ADSL(2) Trans-port	\$39	\$198	Waived(1)	Waived(1)	\$59

Internet Access(3) \$10 \$21.95

Downstream connection rates of up to 6 Mbps, guaranteed at 1.5 Mbps, 384 Kbps upstream

	Monthly Service (1- Year or Longer Term)	Customer Premise Equipment	Equipment Installation	ADSL Service Installation	Month-to-Month Service
Pacific Bell ADSL(2) Trans-port	\$129	\$198	Waived(1)	Waived(1)	\$149
Multi User (up to 256 accounts) Internet Access(3)	\$199	--	--	--	\$299

-- Equipment and service installation charge waived for customers who

- sign up for one-year term or longer
 - Month-to-Month, 1-Year and 3-Year terms are available for ADSL service
 - Discounts are available for retail customers who purchase more than 50 ADSL lines
 - A basic telephone line, either business or residential, is required for ADSL service
1. With term commitment. One-time charges of \$497 apply for Customer Premise Equipment and installation for those customers who choose month-to-month service.
 2. All components of the product are available separately.
 3. Internet Access provided by Pacific Bell Internet Services includes a Global Service Provider charge.

Pacific Bell
ADSL Central Offices
1999 Deployment

The following central offices will be deployed throughout 1999 in California.

- Agoura El Dorado Monterey San Gabriel
- Alameda El Monte Moraga San Jose(8)
- Albany El Toro Msvl Franklin San Juan
- Alhambra Encinitas Mountain View San Luis Obispo
- Anaheim (2) Escondido Napa San Marcos
- Antioch Eureka Main National City San Mateo
- Aptos Fair Oaks Nevada City San Pedro
- Arcadia Fairfield Newhall San Rafael
- Arlington Fallbrook Nimbus San Ramon
- Arroyo Grande Fremont(2) Hollywood(2) Santa Ana(3)
- Auburn Mn. Fresno(3) Sacramento Santa Clara(2)
- Bakersfield (3) Fullerton Northridge Santa Cruz(2)
- Balboa Garden Grove Oakland(4) Santa Marguerita
- Benicia Gardena Oceanside Santa Rosa(3)
- Berkeley Glendale Orange(3) Sausalito
- Beverly Hills Grass Valley Orinda Scotts Valley
- Bishop Ranch Half Moon Bay Oroville Sebastopol
- Blue Revine Hawthorne Pacific Beach Sherman Oaks
- Boulder Creek Hayward(2) Pacifica Shingle Springs
- Brea Hercules Palmdale Simi
- Brentwood Hesperian Palo Alto(2) So. Tahoe Sussex
- Buena Park Hollywood Paramount Solamint
- Burbank Ignacio Park Sorrento Sonoma
- Burlingame Irvine(2) Pasadena(2) Stockton(2)
- Canoga Park La Brea Petaluma Sunnyvale(2)
- Carlsbad (2) La Crescenta Pittsburg Tiburon
- Carmel La Jolla Placentia Torrance
- Chico La Mesa Placerville Tracy
- Chula Vista (2) Lafayette Pleasanton(2) Truckee
- Clayton Laguna Nigel Poway Midland Turlock

- Clovis Larkspur Rancho(3) Tustin
- Colma Livermore Redding Ukiah
- Compton Lodi Redwood City Union City
- Concord Lomita Reseda Vacaville
- Corona Los Altos Richmond Vallejo
- Corona Del Mar Los Angeles(16) Riverside Van Nuys
- Costa Mesa Martinez Rosemead Ventura(2)
- Cotati Menlo Park S. Placer Rocklin Visalia
- Culver City Merced Sacramento(5) Vista
- Danville (2) Mill Valley San Bruno Walnut Creek
- Davis Millbrae San Carlos Watsonville
- Del Mar Milpitas Abel San Clemente West Los Angeles
- Douglas Mission San Diego(10) Woodland
- Edgewood Mission Viejo San Francisco(9) Yorba Linda
- El Cajon Modesto

SOURCE: Pacific Bell

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and News: • SBC Communications Inc (NYSE:[SBC](#) - [news](#))
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Tuesday January 12, 11:28 am Eastern Time

Company Press Release

SOURCE: Level 3 Communications, Inc.

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delayed 20 mins - disclaimer		

Level 3 Communications to Install 10-12 Conduits in 16,000-Mile Inter-City Network

Feasibility Testing Confirms Level 3 Can Install Additional Conduits Without Affecting Network Quality or Production Schedule

OMAHA, Neb., Jan. 12 /PRNewswire/ -- Level 3 Communications, Inc. (Nasdaq: [LVLT](#) - [news](#)) today announced it will install 10-12 conduits throughout the company's approximately 16,000-mile inter-city network currently under construction. Previously, the company had announced its intention to install 6-8 conduits on the network. Level 3's network will be the first to use Internet Protocol (IP) technology end to end and the first to be continuously upgradeable.

Extensive feasibility testing has confirmed that Level 3 can install additional conduits without affecting the network's quality or production schedule. In general, the company will install groups of 10 conduits (each 1 1/4" in diameter) in its inter-city IP network. However, up to 12 conduits will be installed in areas where future network demand is expected to be strongest. Such areas will likely include segments between San Francisco and Los Angeles, as well as from Chicago to Washington, D.C. to New York. Level 3's inter-city network, which is expected to be completed during the first quarter of 2001, will connect approximately 50 local city networks where Level 3 will have facilities to provide local service. It will also connect approximately 150 other cities where the company may determine not to build a local network.

"Adding additional conduits at the outset is a fairly inexpensive and strategic way for Level 3 to 'future proof' its network in the face of rapidly changing technology and customer demand," said Kevin O'Hara, executive vice president and COO of Level 3 Communications. "Today, we are seeing a new generation of fiber every three to four years. Other technologies, such as Dense Wave Division Multiplexing (DWDM), are changing just as rapidly. A key part of our strategy is to ensure that our network is continuously upgradeable."

Of the 10-12 conduits installed, fiber will be placed initially in only one conduit, thereby allowing for future expansion to deploy the latest fiber technology or to meet increased customer demand. Installation of up to 12 conduits gives Level 3 nine to eleven times as many "spare" conduits as most traditional telephone companies. The installation of additional conduits is not expected to affect Level

3's previously announced network construction schedule.

“The old thinking was that fiber technology would be state-of-the-art for 20 years or more,” added O’Hara. “So historically, telephone companies either had no spare conduits or only a single spare. This made it difficult to expand as customer demand increased or as technology changed. The only alternative these older companies had was to lay new conduit or fiber. Level 3, on the other hand, has made ongoing network upgradeability via multiple conduits a key component in its business strategy, allowing us to take advantage of new technologies while continuing to drive down our costs.”

About Level 3 Communications

Level 3 Communications, Inc., is a communications and information services company that is building the first international network optimized for Internet Protocol technology. The Level 3 Network will combine both local and long distance networks, connecting customers end-to-end across the U.S. and in Europe and Asia. The company expects to complete the U.S. inter-city portion of the network during the first quarter of 2001. In the interim, Level 3 has leased a national network over which it began to offer services in the third quarter of 1998. Level 3 will provide a full range of communications services (including local, long distance, international and Internet services). Level 3's common stock is traded on The Nasdaq National Market under the symbol LVLT. Its World Wide Web address is www.Level3.com.

The statements made by Level 3 in this press release may be forward- looking in nature. Actual results may differ materially from those projected in forward-looking statements. Level 3 believes that its primary risk factors include, but are not limited to: substantial capital requirements; development of effective internal processes and systems; the ability to attract and retain high quality employees; changes in the overall economy; technology; the number and size of competitors in its markets; law and regulatory policy; and the mix of products and services offered in the company's target markets. Additional information concerning these and other important factors can be found within Level 3's filing with the Securities & Exchange Commission. Statements in this release should be evaluated in light of these important factors.

SOURCE: Level 3 Communications, Inc.

More Quotes and News: [LEVEL 3 COMMS \(Nasdaq:LVLT - news\)](#)

Related News Categories: [telecom](#)

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Lucent To Buy Ascend Communications

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By NOELLE KNOX AP Business Writer

[Lotteries](#)

NEW YORK (AP) -- Lucent Technologies Inc., the huge telecommunications equipment maker, is buying Ascend Communications Inc. for about \$20 billion in stock in a deal that could reshape the market for telecom equipment and speed the growth of telephone calls on the Internet.

[International](#)[National](#)[Washington](#)

The deal, announced today, should also fill gaps in Lucent's product line with the addition of Ascend's equipment designed to help telecommuters hook up to their headquarters, and to assist businesses in creating their own computer and telephone networks.

[Business](#)[Wall Street](#)

"It's a very strategic fit," said Liza Henderson, director of consulting for TeliChoice Inc., telecom consulting firm in Boston.

[Entertainment](#)[Health/Science](#)

Lucent, spun off from the AT&T Corp. in 1996 and based in Murray Hill, N.J., is a pioneer in telecommunications research and a venerable supplier of traditional equipment used by telephone companies.

[Regional](#)

Ascend, which is based in Alameda, Calif., is a major supplier of computer networking gear, and is expected to provide the expertise in Internet-style communications technology Lucent needs to compete in the \$200 billion-a-year telecommunications industry.

Ascend competes in a field dominated by Cisco Systems, the networking company that has supplied about three quarters of the nuts and bolts used to build the Internet.

Reports of Lucent's acquisition of Ascend had been circulating for several days, but the two companies have been talking for more than a year.

While Lucent helped adapt telephone lines for online data transmission, Cisco has led the charge toward providing video and audio capabilities on the Internet and computer networks.

With both Internet access providers and cable television companies gearing up to provide telephone service, Lucent stands to fall behind in a lucrative market that its technology helped make possible.

Rich McGinn, chairman and chief executive of Lucent, said the deal gives Lucent a "broader and more powerful portfolio" on

developing the next generation of networks for delivering phone calls, handling data transfers and providing video services.

Under the deal announced today, each share of Ascend will be exchanged for 0.825 shares of Lucent.

Based on Lucent's close of \$107.87 1/2 a share on Tuesday, the deal would value each Ascend share at about \$89.82, or 19.9 percent more than Ascend's closing price of \$74.93 3/4 a share Tuesday.

But Lucent's stock was down \$4.81 1/4 at \$103.06 1/4 a share in late morning trading on the New York Stock Exchange at a time when stocks were broadly and sharply lower in response to economic turmoil in Brazil. Ascend's shares shot up \$4.81 1/4 to \$79.75 on the Nasdaq Stock Market.

It is the second deal this week for Lucent. On Monday, Lucent announced it was paying \$1.5 billion in stock for Kenan Systems Corp., which makes software for billing and customer service.

(PROFILE (CO:Lucent Technologies Inc; TS:LU; IG:CMT;)
(CO:Ascend Communications Inc; TS:ASND;)(CO:AT&T Corp;
TS:T; IG:CMT;)(CO:Cisco Systems; TS:CSCO; IG:CPR;))

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Thursday January 7, 7:36 am Eastern Time

Company Press Release

Qwest Significantly Expands Network

On Target For Completion Mid-Year

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QWST	54 1/4	-11/16

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DENVER--(BUSINESS WIRE)--January 7, 1999--Qwest Communications International Inc. today said it has completed construction of 12,500 miles of its technologically-advanced U.S. fiber optic network and connected 16 additional key markets as it speeds toward a mid-year finish linking 130 cities over 18,500 miles. In addition, 17,000 miles of conduit and 15,000 miles of cable have been installed around the nation.

The new markets where service is being introduced with the Qwest Macro Capacity Fiber Network with global reach are Washington, DC to Charlotte, NC; Albany, NY to Westfield, MA; Atlanta, GA to Tallahassee, FL; Philadelphia to Harrisburg, PA; Chicago, IL to Detroit, MI; Indianapolis, IN to Louisville, KY; Topeka, KS to Des Moines, IA; to Bakersfield and Stockton, CA.

"We are continuing to make significant progress in building our network," said Joseph P. Nacchio, president and CEO of Qwest. "In less than a year, we have built about one-half of the newest fiber optic network in the world, completing construction of two thirds of our network in the U.S. Our network is ready now for the explosive growth from business and consumer demand for Internet-based data, voice and image communications as well as traditional voice and data communications," Nacchio added.

In addition to expanding the reach of the Qwest network, significant additional capacity has been added to markets already in service. A total of 1.6 million OC-3 (optical carrier, 155 Mbps) miles were added to the Qwest network in the fourth quarter of 1998. This additional capacity is required to meet the rapidly-increasing customer demand for high speed transmission.

Consistent with building a state-of-the-art domestic fiber optic network, Qwest is partnering with Microsoft Corp. [[Nasdaq:MSFT - news](#)] for complex web hosting, virtual private data networks and managed software services. A three-year exclusive agreement between Netscape and Qwest is in place for portal and browser integration, long distance service for consumers and the Netscape backbone network.

Qwest also has a pan-European venture with KPN, the Dutch telecommunications company, to build and operate a high-capacity fiber optic, Internet Protocol-based network that covers 2,100 miles and

will span 9,100 miles when it is completed by 2002. Qwest also has nearly completed a 1,500-mile network in Mexico.

This release may contain forward-looking statements that involve risks and uncertainties. These statements may differ materially from actual future events or results. Readers are referred to the documents filed by Qwest with the SEC, specifically the most recent reports which identify important risk factors that could cause actual results to differ from those contained in the forward-looking statements, including potential fluctuations in quarterly results, dependence on new product development, rapid technological and market change, failure to complete the network on schedule and on budget, financial risk management and future growth subject to risks, Qwest's ability to achieve Year 2000 compliance, adverse changes in the regulatory or legislative environment, and satisfactory negotiation and execution of definitive documentation.

The Qwest logo is a registered trademark of Qwest Communications International Inc. in the U.S. and certain other countries.

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Tuesday January 12, 10:03 am Eastern Time

Company Press Release

SOURCE: RCN Corporation

RCN Obtains Critical Cross-Country Fiber Internet Backbone

Deal With Level 3 Communications Will Allow RCN, Northeast's Largest Regional Internet Service Provider, to Connect to Major Internet Connections Across the Country

PRINCETON, N.J., Jan. 12 /PRNewswire/ -- RCN Corporation (Nasdaq: [RCNC](#) - [news](#)) today announced an agreement with Level 3 Communications, Inc. (Nasdaq: [LVLT](#) - [news](#)) that will provide RCN, the Northeast's largest regional Internet Service Provider (ISP), with a robust cross-country fiber backbone allowing connectivity to major Internet connection points in the U.S.

The nationwide link will provide fast and reliable service to RCN's nearly 500,000 Internet subscribers, and allow the company to negotiate peering agreements that will allow the exchange of data traffic with other Tier One ISPs. With this agreement, RCN now has a fully-redundant, nationwide clear-channel DS-3 Network, with a presence at two major Internet Network Access Points (NAPS) and with three additional NAP connections pending.

"This cross-country link is an essential element of our plan to provide the highest levels of service to RCN's Internet subscribers on both the East and West Coasts," said RCN Chairman and CEO David C. McCourt. "It supports RCN's plan to become a truly bi-coastal communications company offering service over one connected and cohesive network. This strategy will lower our costs and offer the economies of scale so essential to preserving RCN's status as the low-cost operator in all of the markets we serve."

"We are pleased to be providing RCN with some of the underlying network capacity for their Internet services," said James Q. Crowe, President and CEO of Level 3. "We have had a long-standing relationship with RCN and look forward to this opportunity to serve them as a customer."

The Level 3 nationwide Internet link will provide RCN's Internet customers faster speed and decreased latency, critical elements of an enjoyable and productive on-line experience.

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Level 3 is a communications and information services company that is building the first international network optimized for Internet Protocol technology. The Level 3 Network will combine both local and long distance networks, connecting customers end-to-end across the U.S. and in Europe and Asia.

RCN Corporation (Nasdaq: [RCNC - news](#)) is the nation's first and largest single-source, facilities-based provider of communications services to the residential market, the largest regional Internet service provider (ISP) in the Northeast and the nation's seventh largest ISP. The company is currently providing local and long distance phone, cable television and Internet services in several markets from Boston to Washington, D.C. RCN has expanded its target market to include California's San Francisco to San Diego corridor. Additional information about RCN's services may be found on the company's web site at <http://www.rcn.com>

SOURCE: RCN Corporation

More Quotes and News:

- [LEVEL 3 COMMS \(Nasdaq:LVLT - news\)](#)
- [RCN Corp \(Nasdaq:RCNC - news\)](#)

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Friday January 8, 11:05 am Eastern Time

Company Press Release

SOURCE: RCN Corporation

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RCNC	23 7/8	-1 1/8
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RCN to Provide High-Speed Internet, Phone and Cable Services to Boston-Area Town of Watertown

Agreement Marks RCN's 12th Local Approval in Boston Market

PRINCETON, N.J., Jan. 8 /PRNewswire/ -- RCN Corporation (Nasdaq: [RCNC](#) - [news](#)) today signed an agreement with the Boston-area town of Watertown that will allow it to build a state-of-the-art local fiber optic network capable of providing the extremely high-density community's 16,000 homes with high-speed Internet access, local phone, long distance and cable television. The deal marks RCN's 12th local approval in the Boston market.

With more than 210 homes per mile of network, Watertown has a density more than seven times the national average. In keeping with its strategy of being the low-cost operator in all of the markets it serves, RCN seeks out communities with comparatively high densities so it can minimize network maintenance costs while ensuring the highest levels of service to its customers.

"In addition to the extremely high density and the current lack of a high-speed Internet provider, I am particularly excited about adding Watertown to RCN's growing service area because I was raised there," said RCN Chairman and CEO David C. McCourt. "I look forward to being able to provide my hometown friends and neighbors state-of-the-art phone, cable and Internet services."

Under terms of the agreement, RCN will immediately begin construction of the network that is scheduled for completion by the end of this year or early in the year 2000. The company expects to begin customer connections toward the latter half of 1999.

In addition to Watertown, RCN currently has local approvals to serve the following Boston-area cities and towns: Boston, Somerville, Arlington, Newton, Brookline, Wakefield, Framingham, Hudson, Waltham, Randolph and Quincy.

In addition to its growing number of phone and cable customers, RCN over the past year has established a base of nearly 500,000 Internet subscribers through four major acquisitions and strong internal growth. With the internal integration of its four major Internet Service Provider (ISP) acquisitions complete, RCN last week announced the external integration of these successful and

well-respected ISPs under a common brand name offering a new standard of Internet services: RCN.com. The company launched the new brand with a major print, radio and television advertising initiative throughout RCN's Boston to Washington, D.C. target market.

RCN Corporation (Nasdaq: [RCNC - news](#)) is the nation's first and largest single-source, facilities based provider of telecommunications services to the residential market, the largest regional Internet service provider (ISP) in the Northeast and the nation's seventh largest ISP. The company is currently providing local and long distance phone, cable television and Internet services in several markets from Boston to Washington, D.C. RCN has expanded its target market to include California's San Francisco to San Diego corridor. Additional information about RCN's services may be found on the company's web site at www.rcn.com

SOURCE: RCN Corporation

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Tuesday January 12, 4:02 pm Eastern Time

FOCUS-SBC seeks to dominate high-speed Web access

By Simon Hirschfeld

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NEW YORK, Jan 12 (Reuters) - SBC Communications Corp. (NYSE:[SBC](#) - [news](#)) said it plans to offer high-speed Internet access to 9.5 million potential customers across most of its Western region by the end of 1999, in a bid to dominate service to homes and businesses.

The San Antonio-based Baby Bell currently has the ability to offer the high-speed ADSL, or asymmetrical digital subscriber line, service to two million customers in California. The company does not release the number of customers who currently use the service.

High-speed lines can make clicking through the Internet as fast as changing television channels, in contrast to the sometimes sluggish performance of conventional phone lines.

SBC will triple ADSL deployment in California and roll out service in Texas, Missouri, Oklahoma, Kansas and Arkansas.

It will also begin a trial offer of ADSL, one of the two main high-speed data access technologies, in Connecticut through Southern New England Telecommunications. SBC bought SNET, Connecticut's largest phone company, for \$4.4 billion in October.

Being first to offer ADSL service is an advantage, according to Paula Reinman, a telecom consultant with Telechoice and former director of ADSL marketing at SBC, as it is more difficult to switch data access service than long-distance service, especially for business customers.

"It's definitely a market where the first one is able to skim the cream of easy, low cost-of-acquisition sales," she said.

It may also give SBC an edge over cable companies who can provide high-speed access with cable modems. "A big element to today's announcement is that it positions us to win the availability race with cable modems," David Gallemore, SBC's vice president for strategic marketing, told Reuters.

Gallemore said cable modem availability in California is about 800,000, compared with SBC's ADSL reach of two million, and he believes the planned deployment will dwarf cable modem availability in

SBC's territory.

SBC plans to offer ADSL access to residential customers for \$49 a month for those who use SBC as their Internet service provider (ISP), or \$39 if they use their own ISP. SBC has been selling ADSL access for \$89 a month in California.

Although more than double the typical cost of Internet access through regular phone lines, Gallemore said he believes demand is increasing for ADSL, which also allows customers to use a phone or fax while connected to the Internet.

SBC claims the new deployment will make it the largest provider of ADSL connections in the U.S., though Reinman thinks so far SBC has lagged behind other big regional providers such as US West Inc. (NYSE:[USW](#) - [news](#)) and GTE Corp. (NYSE:[GTE](#) - [news](#)), and faces competition in its own region from smaller local carriers.

SBC shares fell 44 cents, to \$54.56, in afternoon trade on the New York Stock Exchange.

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Tuesday January 12, 9:07 am Eastern Time

Company Press Release

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SNET to Begin ADSL Trial in Connecticut

New Lightning-Fast Service for Data, Internet Access SNET Trial Part of Broader SBC Commitment to Widely Deploy DSL

NEW HAVEN, Conn., Jan. 12 /PRNewswire/ -- A new service that will be offered in a market trial by SNET later this month will enable residential and business customers to access the Internet, e-commerce applications and data files up to 50 times faster.

In plans filed last week with the state Department of Public Utilities Control, SNET said that it will initiate a trial of Asymmetrical Digital Subscriber Line (ADSL) service in Bristol, New Haven and Waterbury, and two additional towns to be named later. The trial is set to begin January 21.

The trial of ADSL service in Connecticut is part of a broader plan by SBC Communications, SNET's parent company, to undertake the largest ADSL offering in the United States. By the end of 1999, SBC intends to provide ADSL service from 526 central offices to 8.2 million residential customers and 1.3 million business customers.

"This announcement fulfills one of the commitments we made at the close of the merger of SNET and SBC," said Tom Morgan, SNET president and CEO. "Our promise is to introduce advanced telecommunications services to consumers and businesses in Connecticut. The trial of ADSL service is just one example of the ways in which Connecticut customers will benefit from SBC's resources and technology expertise."

ADSL: A Better Broadband Solution

"Always on" ADSL technology enables customers to simultaneously use a phone or a fax machine while getting downstream connection speeds up to 1.5 megabits per second -- 50 times faster than today's common 28.8 analog modems.

In addition to downloading data, graphics, audio and video, ADSL's speed transforms e-commerce transactions by creating faster responses for online traders and buyers, faster information exchanges between business partners and faster online sales.

When compared to cable modems, ADSL ensures greater reliability, better security and more consistent speeds, experts say, because the service is delivered via a dedicated line from a central office to the individual user's home or office. ADSL's "always on," dedicated connection provides a high degree of security and reliability for e-commerce, online banking and Internet trading, and enables customers to immediately surf the Internet or launch applications without waiting for a dial-up connection to be established.

Deployment Plans

"This trial will give us valuable information in determining how we will deploy ADSL," said Morgan. "We want to offer customers an affordable, high-speed, high-bandwidth service."

The trial in Connecticut includes three phases to: verify compatibility of the new technology with SNET's existing network; establish processes and systems necessary to provide high-quality ADSL service; and provide valuable customer feedback and marketplace information, enabling SNET to develop product solutions best suited for Connecticut consumers and businesses.

In the final phase, SNET will explore its options for expanding ADSL availability.

Outside of Connecticut, SBC's plans to broadly deploy ADSL in its Pacific Bell and Southwestern Bell territories will make affordable, high-speed, high-bandwidth Internet access available for millions of consumers and businesses. In California, where more Internet traffic begins and ends than anywhere else in the world, SBC's Pacific Bell will nearly triple its current deployment and offer ADSL service in 255 wire centers that serve 70 percent of its customers. Southwestern Bell intends to deploy ADSL in 271 central offices by the end of the year. Once its tariff filing with the Federal Communications Commission is approved, Southwestern Bell intends to begin marketing ADSL service later in the first quarter of 1999.

For up-to-the-minute news, visit www.snet.com.

SNET is a leading information, communication and entertainment company in Connecticut, offering a full range of wireline products including SNET All Distance service as well as wireless voice and data services, Internet access and cable TV. In the latest J.D. Power national customer satisfaction survey, SNET was ranked the number one long-distance company in America among mainstream users for the second straight year. SNET is a company of SBC Communications Inc. (NYSE:[SBC](#) - [news](#); www.sbc.com), a global leader in the telecommunications industry, with more than 36.9 million access lines and 6.5 million wireless customers across the United States, as well as investments in telecommunications businesses in 11 countries. Under the Southwestern Bell, Pacific Bell, SNET, Nevada Bell and Cellular One brands, SBC, through its subsidiaries, offers a wide range of innovative services. SBC offers local and long-distance telephone service, wireless communications, data communications, paging, Internet access, and messaging, as well as telecommunications equipment, and directory advertising and publishing. SBC has approximately 129,000 employees and its annual revenues rank it in the top 50 among Fortune 500 companies.

SOURCE: SNET

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Teledesic Applauds Launch of Iridium's Global Phone Service

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KIRKLAND, Wash. – Nov. 2, 1998 – Teledesic LLC, which is building a next-generation global, broadband "Internet-in-the-Sky," today applauded the commercial launch of Iridium LLC's global satellite-based wireless phone service.

"Iridium and its prime contractor, Motorola, have accomplished a technical feat that's truly amazing," said Teledesic Chairman Craig McCaw, noting that Motorola also is Teledesic's prime contractor. "With Iridium, Motorola has built and deployed the largest, most complex satellite communications system in existence."

The services and target markets of Iridium LLC and Teledesic differ in that Iridium provides narrowband, mobile voice service – the satellite equivalent of cellular service – whereas Teledesic will provide broadband telecommunications services primarily to fixed users – the satellite equivalent of a fiber-optic access link.

Motorola became the prime contractor for the Teledesic system in May and announced it would invest \$750 million in cash and development assets in the company. Matra Marconi Space, Europe's leading satellite manufacturer, and The Boeing Company, the world's leading aerospace company, are Teledesic's other founding industrial team members. Teledesic's global service is targeted to begin in 2003. Iridium LLC introduced its service on Nov. 1.

"We're rooting for Iridium to succeed. In a sense, Iridium is a technological precursor to our system. We hope to learn from the Iridium experience as we build our system," said Teledesic co-CEO Steve Hooper. "From Iridium's voice service to Teledesic's future broadband service, we're just now entering the era of ubiquitous communications. The benefits of the information age soon will extend to the far reaches of the globe."

Using a constellation of low-Earth-orbit satellites, Teledesic is the first licensed satellite communications network that will enable affordable, worldwide access to "fiber-like" telecommunications services such as broadband Internet access, videoconferencing and interactive multimedia. In September,

Teledesic opened its first two European offices – in Brussels, Belgium, and Madrid, Spain – to reinforce its commitment to Europe and to support the company's expanding global efforts.

McCaw and Microsoft Chairman Bill Gates are the two primary founding investors in Teledesic. Other investors include Motorola, Saudi Prince Alwaleed Bin Talal and Boeing. Teledesic (pronounced "tel-eh-DEH-sic") is a private company based in Kirkland, Wash., a suburb of Seattle.

###

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Teledesic Moves Toward Space-Based Net

02/27/98 - Updated 09:53 AM ET
By Kevin Maney, USA TODAY

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Teledesic – the Internet-in-space company backed by Bill Gates and Craig McCaw – put its first test satellite into orbit late Wednesday. The launch was kept secret until Thursday.

The satellite, dubbed the T1, marks the first successful orbit of a commercial Ka-band low-earth orbit (LEO) satellite. LEOs are expected to be at the heart of a number of next-generation satellite communications systems, analysts say.

"So far, it's normal operations" for the satellite, says Barron Beneski of Orbital Sciences, which launched the T1.

Teledesic has had its doubters since the audacious \$9 billion project was unveiled in 1994. While the project is still far from reality, the test satellite is the first tangible sign of life. It also gives Teledesic a step on Motorola, which is building a similar system called Celestri.

The T1 was put in orbit by a Pegasus rocket, which is launched from underneath an airborne L-1011 jet.

The test satellite is not like those that will be part of the Teledesic system, but it will allow Teledesic to run trials of its plans. "It's good for our team to be actively working with real hardware," says Russell Daggatt, Teledesic's president. "It's nice to be dealing with something other than equations on paper."

Teledesic's LEO whips around the Earth about 350 miles up, compared with 25,000 miles up for geostationary satellites such as those used for DirecTv. Because LEOs fly so low, there is little delay relaying communications - a necessity if satellites are to handle Internet-style traffic.

Teledesic, which has been closely watched because of the involvement of cellular pioneer McCaw and Microsoft CEO Gates, is planning to build a constellation of 288 LEOs. They will serve as a space-based, high-bandwidth Internet. Any

computer worldwide armed with a special antenna could connect to the system.

Teledesic and Celestri could carry video or other data services to villages in China or U.S. city dwellers who can't get good Internet connections via phone or cable lines.

Teledesic probably will send more test satellites before putting up the first production models in mid-2001. The system is to be up and running by late 2002.

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The Orbiting Internet: Fiber in the Sky

November 1997 / [Cover Story](#) / The Orbiting Internet: Fiber in the Sky

Broadband satellite systems stand ready to bring multimegabit data rates worldwide. Sounds great, but what's the catch?

John Montgomery

Something special is in the air: your data. Or, at least, it's about to be. The regulatory hurdles to create true high-speed satellite networks have fallen, and mid-bandwidth systems such as Motorola's Iridium and Hughes' DirectView are almost a parlor trick compared to the promise of 2 Mbps, 20 Mbps, and even higher rates streaming down from the sky. And all you need is a small antenna, a satellite gateway (a small black box), and the service itself. In all, you'll probably buy satellite service pretty much the way you buy Internet service from an Internet service provider.

So, it's time to ditch your T1 lines and asynchronous transfer mode (ATM) networks, right? Not quite yet. Just as Iridium's universal telephone didn't kill the cellular phone, broadband satellite systems won't kill terrestrial lines. Every broadband satellite system has to be clear that broadband satellite systems will complement terrestrial networks to provide high-speed service where terrestrial infrastructure does not exist, a simple multipoint distribution of video. But high-speed, low-cost landlines are a different matter.

So where *will* these emerging data networks fit in? Better yet, *how* will they differ from each other? Simple questions, it seems. The answer is simple -- at least until you start to dig. By examining some of the main systems under development, I was able to determine that these systems, while touting many capabilities, are vastly different. Some of the most visible ones may prove difficult to implement. Some of the most staid-looking systems may beat every other system in the punch.

Playing with the Bands

Satellite communications is nothing new. For years, you could hook up a very expensive terminal (VSAT) system and buy time on a satellite. Dennis Conti, vice president of Hughes Network Systems, says that a VSAT system can deliver up to 24 Mbps in a point-to-multipoint link (e.g., a multicast) and up to 1.5 Mbps in a point-to-

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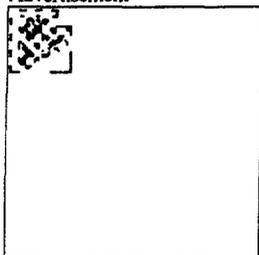
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impressive statistics.

But, according to Tony Trujillo, director of corporate communications at I global satellite operator, with VSAT, "customers buy very specific time on ite." This creates a system that's good for predictable communications (e.g. by news agencies or satellite offices), but not so good for the ad hoc netwo us are used to.

For "anytime, anywhere" networking, you need new technologies. Primary more tightly focused beams and digital signal technology, which together c frequency reuse (and thereby increase bandwidth) and reduce dish size fro centimeters. According to some, you also need a large and unused chunk o electromagnetic spectrum.

All these technical requirements began to come together in 1993, when N/ Advanced Communication Technology Satellite, or ACTS (see the sidebar the ACTS"). ACTS pioneered the testing of an all-digital, Ka-band (20-30 geosynchronous earth orbit (GEO) satellite system -- for definitions of the sidebars "The Air Up There," "NASA Gets into the ACTS," and "I'm w ith capable of delivering hundreds of megabits per second of bandwidth. With that such a system could work (and offering time on the system to intereste was not long before others were interested. Very interested.

Earlier this year, the FCC granted orbital locations and Ka-band licenses to Some are names you may recognize: EchoStar, Hughes, Loral, and MOTO more obscure: Ka-Star, NetSat 28, PanAmSat, and Teledesic. Regardless o recognition, they all aim to bring information into your home and office at -- up to 155 Mbps. These broadband systems are not going on-line before : Loral's Cyberstar will start offering 400-Kbps rates next year), and most wi operational until 2002.

What are they going to use it for? According to the FCC, just about everyth a terrestrial line for: desktop-to-desktop videoconferencing, Internet access messaging, faxing, telemedicine, direct-to-home video, electronic transacti distance learning, and even news gathering.

Is This Trip Necessary?

Who needs this stuff, anyway? Most of the market that needs data services served by landlines. "These systems will be important globally. In the U.S. served, although things are changing quickly," says Erwin Edelman of NA Research Center.

A first guess at an obvious market is in places that have underdeveloped cc infrastructures. In some countries, stringing copper or fiber is out of the qu distances to cover are too great and available money is too little. (There are people will rip down any copper wire to resell it.) Still, a wireless, solar-pc has some appeal. Of course, you don't need a broadband satellite to make p Systems such as Iridium will likely serve that market. Marco Caceres, of th says, "For most of the people in the world, the services Ka-band supplies a

So who *does* need this new class of broadband satellite communications? I heard from virtually every broadband vendor is the same: multinational corporations. For some applications, landlines will always be superior. But when you reach remote areas, have last- and first-mile problems, then satellite will be the better choice," Fitzpatrick, Hughes Communications' vice president for Spaceway.

Of course, there are even places in the U.S. that won't get broadband data service in a reasonable time. For example, until recently, BYTE's office in Peterborough, New Hampshire, has had serious problems getting anything more than a T1. But imagine if satellite services had been in place -- we could have tapped it no matter where we are. This is the second market that most of the broadband vendors cited -- low-population areas.

The main problem satellite systems solve is getting high-bandwidth access to a high-bandwidth infrastructure. It's unlikely that a satellite system could compete with Digital Subscriber Line (DSL) to the home or fiber to the office -- if you can get those services. Still, if you're in a rural area of the U.S. -- or in a low-population area -- you may not be able to get such services. Satellites will deliver them, enabling high-speed Internet browsing (a technology that some industry pundits focus on) but all forms of high-speed networking, including such things as videoconferencing, collaborative work sharing, and telemedicine.

Is the telephone dead? Says Teledesic president Russell Daggatt, "It's not going to replace the current phone network -- the capacity isn't there." Put simply, terrestrial networks and satellite networks will complement each other. "Nobody's going to put up and take out their telephone," agrees Ron Maehl, president of Cyberstar. "We don't think satellite should compete with fiber or Asymmetric Digital Subscriber Line. It should complement them, especially for bursty service. Use the technology that's best suited."

LEO vs. GEO

But bandwidth is only half the story. The other half is latency -- the amount of time it takes for data to get from point A to point B. Here is where the rubber starts to meet the road, and it's good to talk about high-bandwidth satellite systems -- that technology has been around for years. But to deliver on the promise of highly interactive satellite systems is a different matter altogether. "There are some applications not suitable to satellite systems. For example, transactions, for example, are too latency-sensitive."

That is true -- at least for a GEO system such as Astrolink. GEO satellites are 22,300 miles above the equator: 0.24 second -- an eternity to computers -- of round-trip latency built into the system (not counting whatever latency is added by gateways and translations the data must go through), a telephone conversation is an awkward mess. And any kind of interactive application has to be nonlatency-sensitive. Bank of America can probably forget putting its on-line transaction processing system through a geostationary satellite. Such systems include not only Astrolink, Cyberstar and Hughes' Spaceway projects.

So here's a simple solution: Move the satellites closer to earth. That's just what Teledesic, Alcatel's Skybridge, and Motorola's Celestri will do. With low-orbit satellites (LEOs) under 1000 miles, these systems offer latency that's barely apparent.

second.

Of course, it's not that simple. While GEOs are a well-known technology (for example, have been using them for decades), LEOs are new and face new challenges. Perhaps the biggest one is that you need a lot of them to get total global coverage. Teledeco planned a constellation of more than 800 satellites, for example, but recently dropped to 288 when it signed an agreement to work with Boeing on the concept of launching dozens or hundreds of multimillion-dollar satellite systems.

Each of Teledeco's 288 satellites will cost in the realm of \$20 million, according to the company. That's \$5.76 billion just in satellites. That does not include launch fees or insurance. In the case of some satellite systems, the price of the satellite again.

Price is only one issue. Who is going to launch all these satellites? Teledeco has an 18-month to two-year launch window to get its 288 satellites airborne. All system creators are talking about putting more satellites into orbit in the next few years. The world has put into orbit since the Soviets launched Sputnik 40 years ago. To happen, a huge jump in launch capacity is necessary.

Once the LEO satellites are in orbit, there's an entirely new set of problems that matter of space junk: leftovers from past space missions of all sizes, speeds, and orbits. "With all these satellites in orbit, it's possible that debris will start running the show," says the Teal Group's Caceres. "They aren't that far from manned systems." Great needs.

More Problems for LEO

If the satellites don't get aced by space junk, they still will fall into the atmosphere. Unlike GEOs that, when their operational life is over, move into a parking orbit higher than normal, LEO systems will burn up in the atmosphere, like Skylab. A satellite life may be 10 or 12 years, "with LEOs, you must have a plan for satellite replacement," says Myron Wagner, vice president and director of engineering at Celestri system (a hybrid LEO/GEO system). It's possible, however, and Viasat Iridium as a pioneer in this field.

Let's say you solve these challenges. There are more. For example, there's trouble acquiring and tracking these fast-moving satellites. A LEO satellite may be in view for 20-30 minutes before it passes over the horizon. This poses no small feat for the ground station antenna and keeping the link active.

A technology called a phased-array antenna solves the antenna problem. Unlike a parabolic dish, which mechanically tracks satellite locations, phased-array antennas are made of boxes consisting of many smaller antennas. They can track several satellites at once and receive different signals received by the array of antennas -- without physically moving the antenna. Other advantages.

The problem of keeping a link active when your satellite disappears every few minutes is solved by keeping at least two satellites in view at all times (many LEOs will keep you in view). The antenna array is aware of all the satellites' positions and starts a new link as it severs the one to the setting satellite. This is "make before break" in satellite communications.

All LEOs have to solve these challenges. Some of them have others, too. First is the matter of whether a LEO constellation uses intersatellite routing. Then do you get a signal from the footprint of one satellite into the footprint of another. In other words, if a LEO user in New York wants to communicate with one in Moscow, the system needs to figure out how to route the signal.

If the system is a bent pipe, such as Alcatel's Skybridge, the satellites don't do the routing. The LEO satellite over New York will beam the signal down to a ground station which will route the signal over landlines to a ground station near Moscow, which will then beam the signal up to the LEO satellite over Moscow, which will in turn beam it to the user there.

According to Motorola's Wagner, however, "Bent pipes are not good. They hop from sky to earth." And that means dreaded latency -- defeating the purpose of LEOs, which are supposed to be better than GEOs. Instead, some systems, including Telcel's Celestri, use satellite-to-satellite routing. The Teledesic constellation comes in the 40-50-GHz band. Celestri uses lasers for its links.

The downside is, of course, that each satellite has to have more communication hardware -- more intelligence -- and therefore a higher price tag than a bent pipe. The performance gain over a bent pipe is not tremendous -- a few hundredths of a percent.

Alcatel's Skybridge faces yet another set of challenges, because it selected the Ku-band instead of the Ka-band. According to Mark MacGann, director of public affairs at Hughes, this lower frequency lets Skybridge be "the cheapest system in low earth orbit" because Skybridge can use less powerful transmitters. The Ku-band is preferred, though, with many GEOs working there, and that spells interference when Skybridge satellites are over the equator. "We took the GEO arc," says MacGann, "and created a nonoperating zone of a minimum of plus or minus 10 degrees. Once a Skybridge satellite comes within that arc, it shuts off its offending beams, and the ground terminal has to wait for another satellite." A simple solution.

Niches in the GEO Sphere

In spite of the concerns of latency, GEOs and LEOs will likely coexist. Guy Kawasaki, of Leslie Taylor and Associates, sums up the markets based on whether the system is GEO with its inherent 0.24-second delay, or a low-latency LEO. LEOs will be good for interactive networking, teleconferencing, and telemedicine -- interactive applications. GEOs are better for information downloading and video distribution -- broadcasting and streaming.

Some GEO vendors disagree. Hughes' Conti says, "Today, we're able to use GEOs to transport at least 24 Mbps of broadcast IP data and over 2 Mbps of point-to-point data. The latter uses technologies such as TCP spoofing. HNS has been using GEOs for over three years to deliver Internet/intranet content at high speed to both consumers and enterprises." If necessary, ground terminals using the Spaceway system will use TCP spoofing technologies.

But there's still the 0.24-second delay that you just can't get around. Dagga's lossless protocol is going to have problems with this latency. Even if TCP's Nagle's algorithm (and he is skeptical about that, given TCP's 64-Kb buffer), there's the matter of

protocols. "It's reasonable to think that future network protocols will be designed for terrestrial networks," he says. "You need systems that offer low error rates and low latency. People talk about voice and data as though there were two types of data. If the network doesn't work for voice, it won't work for other applications."

LEO Meets GEO

One of the systems I looked at is considering offering the best of both worlds: a hybrid solution. Motorola's Celestri plans a LEO constellation of 63 satellites (initially with one GEO satellite over the U.S. Motorola has the rights to eight more if it needs them. The LEO constellation and the GEO satellites will be able to communicate directly through a satellite-to-satellite network.

"We want users to be unaware of the kind of system they're using. The only way to do that is with a LEO configuration," says Wagner. The hybrid configuration allows Celestri to take advantage of LEO's shorter delays for interactive uses and GEO's broadcast arena.

Alcatel and Lockheed have had similar thoughts. They are looking at a partnership between Skybridge and Cyberstar to work together through land-based gateways to be quite as transparent as Celestri's system, because it will need to route traffic through terrestrial gateways, but it does hint at the power of a hybrid configuration.

Space Security Unit

Once you get beyond the latency and bandwidth issues (which is what they've spent a lot of time arguing over), there is another challenge: security. If you broadcast data packaged up and broadcast into space, can't anybody with a scanner just tune in? The answer is yes. But the access technologies that these systems use -- code division multiple access (CDMA), time division multiple access (TDMA), frequency division multiple access (FDMA), and a bunch of other xDMA protocols -- make that difficult as it will be to intercept a digital cellular signal. On top of that, manufacturers will offer some kind of internal security systems. But exactly what kind? Well, it's murky.

All the vendors I spoke with told me that they were aware of the potential security issues that customers would have. Few, however, had concrete solutions. Sig Dekker, for example, says, "I can say only that it does involve encryption. Additional security at the user level will come by way of public-key encryption." Replicon, Spaceway and Cyberstar were even less forthcoming, saying only that they were aware of the problem and had not yet decided on a solution. Teledesic said that there is security within its network, and, if users want, they can add more. That seems to be the consensus: If you want security, you're going to have to add it yourself.

But is that so different from running private business over any public network? For example, engage in trusted transactions over the Internet? Of course not. You can purchase some kind of encryption software, a virtual private network (VPN) system, for example. And because all the satellite systems claim that they will be compatible with your network, it's likely that the VPN system you purchase for the Internet will -- and just as transparently -- over a satellite system.

Down-to-Earth Price Tags

What will be the price for this magical universal service? Surprisingly, on every company I talked to said it will be probably not much more than your landline services. That may seem like a pretty amazing statement, considering the investment required to get some of these systems running -- Teledesic, forecasting a \$9 billion start-up charge (which some critics say is low); Motorola at \$13 billion. But Teledesic president Daggatt thinks it's reasonable. "It's a high-capacity system. And unlike a wire-line network, where all the capacity infrastructure is rigidly dedicated to locations and users regardless of whether they're actually using it at any particular moment, Teledesic offers 'bandwidth on demand' -- system capacity used is limited to that required by a particular user and a particular application at a particular moment. That allows the high system capacity of the network to extend to a very large user base."

Other system operators agree. Savatiel says, "The price can compete with what you'd pay for like 25 percent utilized T1s." Astrolink will be in the range of 20 to 25 cents per minute for 64 Kbps, but remember that you will pay only for time that you use. "If you value the service to end users, you'll be rewarded," says Savatiel. Astrolink will work hard to try to avoid price gouging -- a practice more common in countries where telecommunications is a monopoly. Cyberstar's Maehl puts it a different way: "We want to wait to see what the market wants." He sees Cyberstar's service coming in a few months for basic service on its Ku-band system (which has a lower bandwidth than the planned Ka-band system) and a similar price on its eventual Ka-band system.

The price you see as a customer, however, is likely to be set by your service provider. Satellite system creators are wholesale service providers. None of them will be selling bandwidth to end users. They'll sell to gateway providers such as Sprint, who will probably resell the satellite bandwidth to service providers, who will sell to customers.

The goal is to make the satellite systems transparent to end users -- you buy the service, and somebody else worries about the plumbing. This transparency is incredibly important. Cyberstar, for example, is working on deals with router vendors to facilitate the routing of hybrid networks. "Satellite guys can't just do satellites -- we have to have the network architecture as well," says Maehl.

Shooting for the Stars

According to analysts conducting research for Motorola, the total telecommunications market is about \$650 billion, and that's going to double in 10 years, chiefly due to the growth of telecommunications. In other words, there are a whole lot of people out there demanding a lot of bandwidth. And we'll need every hose we have to put out that fire: fiber, Synchronous Optical Network (SONET), xDSL, Gigabit Ethernet, cable modems, and probably a few that haven't even been thought of yet.

"I don't think the fact that it's a satellite system is going to make a difference," says Christensen. He sees all telecommunications systems competing on their speed and price. That means there are going to be two big winners: whoever gets the service to consumers first, and whoever can offer the most bandwidth with not-unreasonable latency.

At this point, the race could fall to any of the companies putting together a satellite system. Or even to someone we've never heard of. The profile of the satellite race has changed a great deal since last spring. AT&T has dropped changed its configuration. And Motorola is collapsing two of its systems (the Millennium) into Celestri.

Gentleman, to your launch pads.

Where to Find

Alcatel

Paris, France
Phone: +33 1 4058 5858
Internet:
http://www.alcatel.com/our_bus/telecom/products/space/whats

Hughes Communications, Inc.

Long Beach, CA
Phone: 310-525-5000
Internet:
<http://www.spaceway.com>

Lockheed

Sunnyvale, CA
Phone: 888-278-7565
Phone: 408-543-3103
Internet:
<http://www.astrolink.com>

Loral

Palo Alto, CA
Phone: 650-852-5736
Internet:
<http://www.cyberstar.com>

Motorola

Chandler, AZ
Phone: 602-732-4018
Internet:
<http://www.mot.com/>

Teledesic

Kirkland, WA
Phone: 425-602-0000
Internet:
<http://www.teledesic.com>

Information on products in the networking category

HotBYTES

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Broadband Satellites, Broadly

	Cyberstar	Celestri	Astrolink	Teledesic	Sp
Backers	Loral	Motorola	Lockheed	Bill Gates, Craig McCaw, Boeing	GM
Use	Data, video	Voice, data, video-conferencing	Data, video, rural telephony	Voice, data, video-conferencing	Dat mul
Altitude (miles)	22,300	875 and 22,300	22,300	435	22,300
Spectrum	Ku (initial) and Ka	Ka and also 40-50 GHz	Ka	Ka	Ka
Antenna size (est.)	16 inches (initial Ku)	24 inches	33-47 inches	10 inches	As : 26 i
Data throughput	400 Kbps (initial Ku); up to 30 Mbps (Ka)	Up to 155 Mbps transmit and receive	Up to 9.6 Mbps	16 Kbps-64 Mbps (up to 2.048 Mbps on symmetrical links)	Up Mb
User terminal cost (est.)	\$800 (initial Ku); \$1000 (Ka)	Starts at \$750	Under \$1000 to \$2500	N/A	Unc \$1C
System cost (billions)	\$1.05	\$13	\$4	\$9	\$3.:
Operation starts	1998	2002	Late 2000	2002	200
Number of satellites	TBD for Ku; 3	63 LEOs, 9 GEOs	9	288	8 in

	likely for Ka				
Access method	FDMA, TDMA	FDMA, TDMA	FDMA, TDMA	MF-TDMA, ATDM	FD/TD
Intersatellite communication	Undecided	Yes	Yes	Yes	Yes

Some Satellite Personal Communications Systems

	Ellipso	Odyssey	ICO	GlobalStar	Or
Backers	Westinghouse, Harris, Israeli Aircraft Industries	TRW, TeleGlobe	Inmarsat, Hughes Space Telecom	Loral, Qualcomm, Alcatel, France, and many others	Ort Sci Tel anc oth
Use	Voice, fax, messaging	Voice, fax, messaging	Voice and messaging	Voice, data, and fax	Me anc
Altitude (miles)	Elliptical: 325-4904; 5025	6471	6459	884	484
Spectrum request	UHF	L, S, and Ka	S and C	L, S, and C	VH
Data throughput	0.3-9.6 Kbps	9.6 Kbps	2.4 Kbps	7.2 Kbps	56.
User terminal cost (est.)	\$1000	\$300	Several hundred	\$750	Sta \$50
System cost (billions)	\$0.75	\$1.8	\$2.6	\$2	\$0.
Operations start	1998	2000	2000	1998	199
Number of satellites	17	15	12	56	36

What the Band Names Mean

Band Name	Frequency Range
HF-band	1.8-30 MHz
VHF-band	50-146 MHz
P-band	0.230-1.000 GHz
UHF-band	0.430-1.300 GHz
L-band	1.530-2.700 GHz
FCC's digital radio	2.310-2.360 GHz
S-band	2.700-3.500 GHz
C-band	Downlink: 3.700-4.200 GHz Uplink: 5.925-6.425 GHz
X-band	Downlink: 7.250-7.745 GHz Uplink: 7.900-8.395 GHz
Ku-band (Europe)	Downlink: FSS: 10.700-11.700 GHz DBS: 11.700-12.500 GHz Telecom: 12.500-12.750 GHz Uplink: FSS and Telecom: 14.000-14.800 GHz; DBS: 17.300-18.100 GHz
Ku-band (America)	Downlink: FSS: 11.700-12.200 GHz DBS: 12.200-12.700 GHz Uplink: FSS: 14.000-14.500 GHz DBS: 17.300-17.800 GHz
Ka-band	Roughly 18-31 GHz

Satellite System Overview

System type	Frequency bands	Applications	Terminal type/size
Fixed satellite service	C and Ku	Video delivery, VSAT, news gathering, telephony	1-meter and larger fixed station
Direct broadcast satellite	Ku	Direct-to-home video/audio	0.3-0.6-meter fixed earth station
Mobile satellite (GEO)	L and S	Voice and low-speed data to mobile terminals	Laptop computer/antenna-mount but mobile
Big LEO	L and S	Cellular telephony, data, paging	Cellular phone and pager fixed phone booth
Little LEO	P and below	Position location, tracking, messaging	"As small as a packet of cigarettes" and omnidirectional
Broadband GEO	Ka and Ku	Internet access, voice, video, data	20-cm, fixed
Broadband LEO	Ka and Ku	Internet access, voice, video, data, videoconferencing	Dual 20-cm tracking and fixed

Source: Leslie Taylor and Associates

The Air Up There

[illustration link \(51 Kbytes\)](#)



The two primary considerations with any satellite system are how far from orbit, which affects latency, and the spectrum it uses, which affects how power needs to be and how much data it can carry.

Going Up and Coming Down