Section 7: Cable Modem-Based Internet Access

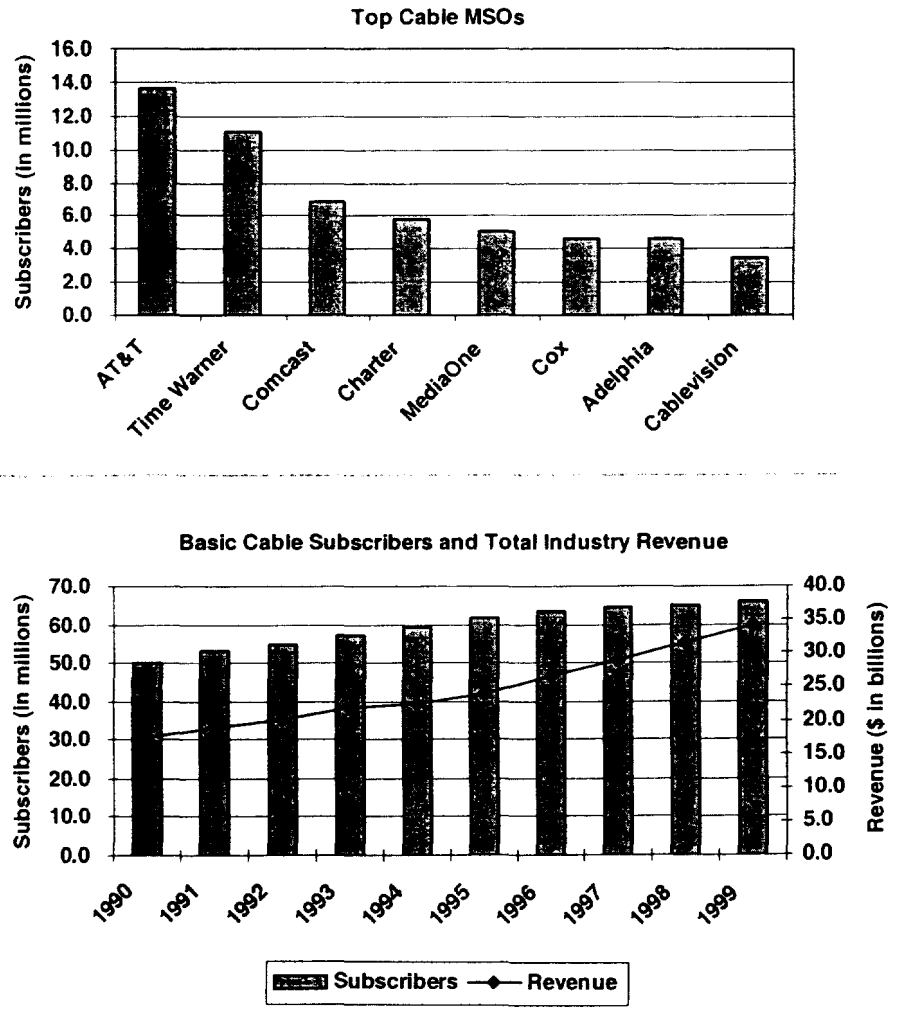
◆ Cable Industry Overview

The cable industry's origins date back to the late 1940s. In order to reach residences in geographically remote regions, operators mounted antennas on mountain-top towers, and homes were wired to these towers to receive the broadcast signals. Since those early days, some 11,000 cable systems have been deployed that collectively pass approximately 95% (96 million) of all U.S. television households. At present, there are approximately 67 million households subscribing to basic cable service, contributing to overall industry revenues of approximately $34 billion.

For more information on the cable industry, please see Dain Rauscher Wessels industry report of December 9, 1999, entitled "The Cable Industry Strikes Up the (Broad) band for the New Millennium."

As a result of municipal franchising requirements, cable systems were originally developed as disparate individual networks. As the industry grew and cable technology developed, a wave of consolidations swept the industry. The leading groups of cable system owners became known as Multiple System Operators (MSOs). Today, the top eight MSOs control more than 83% of cable subscribers.

Exhibit 7-1 ◆ Leading Cable Operators and Industry Growth



* Data as of March 31, 2000.

Source: *Cablevision Magazine*, Cahners In-Stat, and Company reports.

A number of significant developments characterize the cable industry today:

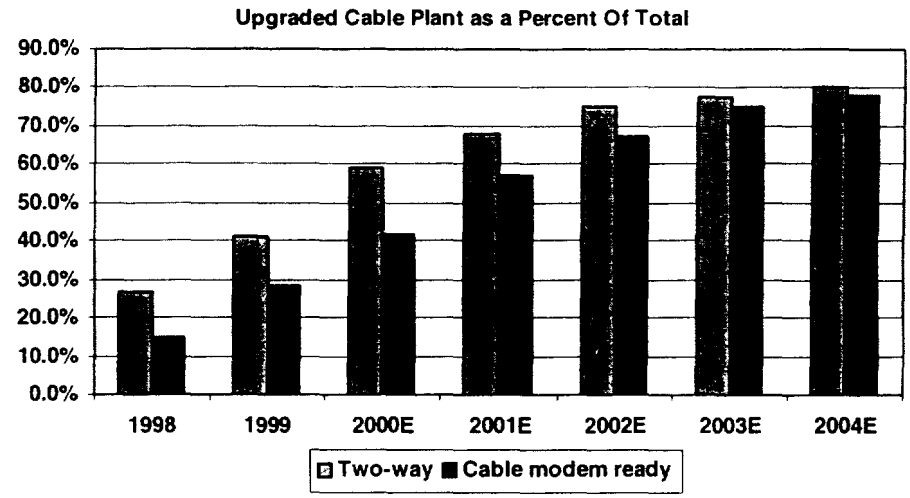
- **Subscriber Growth:** Basic cable subscribers have grown at a compound annual rate of 3% over the last five years, reaching 67 million subscribers and a 70% penetration of homes passed in the United States.
- **Revenue Per Subscriber:** Average revenue per subscriber (unit) has increased over the last several years as a result of rate increases and new service offerings, such as pay per view. While the average basic cable rate is on the order of $25, the average revenue per subscriber is more than $40.
- **Upgrades:** Through the installation of digital video compression, fiber optic, and bandwidth amplification technologies, cable operators have been incrementally upgrading their systems. Average channel capacity has increased significantly, and the number of homes that can access cable Internet service has grown steadily to reach approximately 50% of homes passed.
- **Consolidation:** Over the past decade, the cable industry has witnessed mass consolidation, including most notably AT&T's acquisitions of TCI (completed) and MediaOne (pending), as well as several acquisitions each by Adelphia, Time Warner, Comcast Corporation (Nasdaq: CMCSK; Buy-Average; $37.56), Cox Communications, Inc. (NYSE: COX; Buy-Average; $45.13), and Charter. Today, the top eight MSOs control 83% of all subscribers.
- **Broadband Access:** Coupled with the cable industry's transition to digital technology and the enhanced services it enables, one of the major stories in the cable industry today is high-speed Internet access.

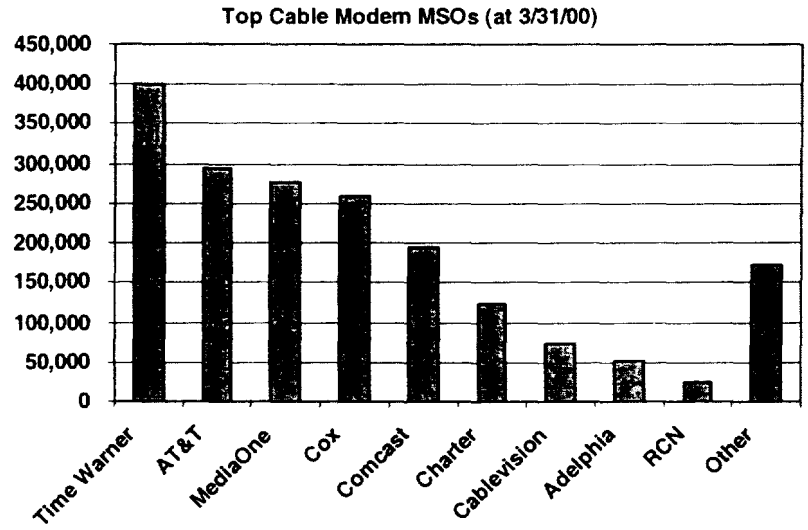
◆ Two-Way Broadband Services

The development of two-way cable Internet systems arose from several factors, including the industry's desire to generate higher revenue per subscriber and competition posed by Digital Broadcast Satellite (DBS) systems in delivering video programming. One of the first methods cable operators used to boost average revenue per subscriber was to offer expanded channel packages for a higher price. However, there exists a limit on the number of channels a cable system can offer. To expand channel offerings, cable operators have expanded the existing analog infrastructure to accommodate more bandwidth, as well as installed digital video compression technology and fiber optic capacity.

Traditional coaxial cable systems typically operate with 330 MHz or 450 MHz of capacity, whereas modern hybrid fiber/coax (HFC) systems are expanded to 750 MHz or more. Each standard television channel occupies 6 MHz of RF spectrum. Thus, a traditional cable system with 400 MHz of downstream bandwidth can carry the equivalent of 60 analog TV channels and a modern HFC system with 700MHz of downstream bandwidth has the capacity for some 110 channels. Over the last ten years, the average channel capacity of cable systems has approximately doubled to close to 60 channels. As a result of this process, cable operators have shortened the transition between the one-way offering of video programming and the two-way provision of broadband services.

Exhibit 7-2 ◆ Two-Way Cable Modem Trends





Source: IDC, Kinetic Strategies, and Company reports

Aided by its conversion to digital technology as well as the growth of the Internet, the cable industry has emerged as a significant player in high-speed Internet services, especially for the residential segment. With near ubiquitous coverage, cable connections provide a potentially powerful platform for providing residences and some businesses with broadband access. Leading operators in North America have formed ventures to address key technical, operating, content, and marketing challenges associated with the wide-scale deployment of cable Internet services. The major cable Internet service providers are Excite@Home and Road Runner, which together account for more than 80% of U.S. cable modem-based Internet subscribers. **Exhibit 7-3** lists several two-way cable Internet players and their major affiliates.

Exhibit 7-3 ◆ U.S. Cable-Based Internet Access Players

Cable Internet Access Providers	Major Cable Affiliates	Cable Internet Subscribers
Excite@Home	AT&T, Cox	1,500,000
Road Runner	MediaOne, Time Warner	730,000
Optimum Online	Cablevision Systems	31,474
RCN	own cable systems	26,700
High Speed Access Corp.	Charter	26,000
Worldgate	various cable operators	19,000
Earthlink	selected Charter systems	12,000
Knology	own cable systems	7,662
Adelphia Power Link	various cable operators	7,566
ISP Channel	various cable operators	7,044
Convergence.com	various cable operators	5,518
Internet Ventures	various cable operators	1,700
Befera Interactive	Range TV Cable, Midwest	500
Cablenet	Communications	

Source: *Cablevision Magazine*, Cahners In-Stat and Company reports

Of note, RCN, Knology, and several new operators are deploying newly constructed cable plant in markets with an incumbent operator already present (this is known as *cable overbuilding*) to offer bundled Internet, video, and telephony services. In addition, some firms' offerings enable subscribers to access the Internet through their televisions—this is in contrast to the majority of cable Internet offerings, which deliver Internet access via the user's personal computer. PC-based cable Internet services are generally priced in the $40 per month range for existing cable subscribers.

Television Delivery of Cable Internet Services: Some cable Internet services deliver access to the television rather than the personal computer. Such services are provided using a dedicated browsing device that links to the set-top box to offer basic applications such as e-mail and casual Web browsing. These services are typically priced in the $10 per month range, significantly lower than most PC-based services. Television-based cable Internet services allow operators to serve the approximately 50% of U.S. households that do not currently own PCs. In addition, Internet-to-television services allow operators to offer a more entertainment-oriented Internet experience (e.g., casual e-mail and Web browsing on a TV screen in the living room) to households that already have one or more PCs.

Exhibit 7-4 ◆ Two-Way Cable Internet Deployment

Cable Company	ISP Relationships	Markets Deployed
AT&T Broadband	At Home	Arlington Heights, IL; Moline, IL; Pittsburgh, PA; Cedar Rapids, IA; Portland, OR; Dallas, TX; Rochester, NY; Denver, CO; Royal Oak, MI; Des Moines, IA; San Francisco Bay Area, CA; East Lansing, MI; Seattle, WA; Hartford, CT; Spokane, WA; Woodhaven, MI
Adelphia	Power Link, ISP Channel (SoftNet)	Coudersport, PA; Lebanon, PA; Lansdale, PA; Pittsburgh, PA; Toms River, NJ; Amherst, NY; Grand Island, NY; Plymouth, MA; Adams, MA; Berkshire, MA; Palm Beach, FL; Stuart, FL; Daytona Beach, FL; West Seneca, NY; Niagara Falls, NY; Burlington, VT; Blacksburg, VA; Bedford, VA; Winchester, VA; Charlottesville, VA; Aiken, Hollis, SC; Butler County, OH; Clermont County, OH; Warren County, OH; Canaan, OH; Sunset, TX
Bresnan Communications	At Home, BresnanLink	Marquette, MI; Midland, MI; Bay City, MI; Escanaba, MI; Manistique, MI; Duluth, MN; Mankato, MN; Madison WI
Cable One	Own ISP	Ada, OK; Biloxi, MS; Sioux City, IA; Fargo, ND
Cablevision of Lake Havasu	ISP Channel (SoftNet)	Lake Havasu City, AZ
Cablevision of Lake Travis	ISP Channel (SoftNet)	Lakeway, TX
Cablevision of Loudoun	Pulse Internet service	Loudoun County, VA
Cablevision Systems	At Home, Optimum Online	Long Island, NY; Westport, CT
Century Communications	Road Runner	Norwich, NY
Charter	HSA Corp., Earthlink, WorldGate	Pasadena, CA; Riverside, CA; Newtown, CT; Maryville, IL; St. Louis, MO; Logan, UT; Birmingham, AL; Hickory, NC; Vincennes, IN; Stevens Point, WI; Gunnersville, AL; Tangipahoa, LA; Turlock, CA; Morristown, TN
Classic Cable	ClassicNet.net (HSA Corp.)	Lebanon, MO; Neosho, MO; Burkburnnet, TX; Iowa Park, TX; Center, TX; Clarksville, TX; Eastland, TX; Breckenridge, TX; Terrell, TX
Comcast	At Home	Atlanta, GA; Augusta, GA; Orange County, CA; Sacramento, CA; Baltimore, MD; Philadelphia, PA; Charleston, SC; Sarasota, FL; Chesterfield, VA; Union, NJ; Detroit, MI; Ft. Wayne, IN; Indianapolis, IN; Olathe, KS; Allenhurst, NJ; Cherry Hill, NJ; East Rutherford, NJ; Cranbury, NJ; Jersey City, NJ
Covington Cable	HSA Corp.	Covington, GA
Cox	At Home	Newport News, VA; Orange County, CA; Meriden, CT; Eureka, CA; Jefferson Parish, LA; Phoenix, AZ; Providence, RI; Oklahoma City, OK; San Diego, CA; Omaha, NE; College Station, TX; Baton Rouge, LA
FrontierVision	Maine Internetworks	Camden, ME; Rockland, ME
Full Channel TV	HSA Corp.	Bristol, RI; Barrington, RI; Warren, RI
Galaxy	ISP Channel (SoftNet)	Alma, MO; Waverly, MO; Higginsville, MO; Concordia, MO; Maltabend, MO; Houstonia, MO; Emma, MO; Blackburn, MO; Seneca, KS; Sabetha, KS; Clay Center, NE; Geneva, NE; Syracuse, NE
Garden Isle	HSA Corp.	Lihue, HI
Grafton Cable	HSA Corp.	Grafton, OH
InterMedia Partners	At Home, Online System Services	Athens, GA; Louisville, KY; Greenville/Spartanburg, SC; Lexington, KY; Nashville, TN; Kingsport, TN
Insight Communications	Road Runner	Columbus, OH
Jones Intercable	At Home	Northern Virginia
Knology	Knology	Augusta, GA; Charleston, SC; Panama City, FL; Montgomery, AL; Columbus, GA; West Point, GA; Huntsville, AL
Marcus	At Home, HSA Corp.	Highland Park, TX; University Park, TX; Eau Claire, WI; Rice Lake, WI
Massillon Cable	WorldGate	Massillon, OH
Mediacom	ISP Channel (SoftNet)	Chillicothe, IL; Hutchinson, MN; Henry, IL; Dagsboro, DE; Evelyn, MN; Jacksonville, IL; Wapello, MN; Huntsville, AL; Franklin/Sylva, NC; Gulf Breeze, FL; Pace, FL
MediaOne	Road Runner, MediaOne Express	Los Angeles, CA; Chicago, IL; Atlanta, GA; Miami, FL; Ft. Myers, FL; Jacksonville, FL; Richmond, VA; Minneapolis, MN; Massachusetts/New Hampshire; Northville/Plymouth, MI; Fresno, CA
Mid-Atlantic Communications	ISP Channel (SoftNet)	Rockville, MD
RCN	Own ISP	Northeast corridor; Chicago, IL; SF Bay Area; Southern California
Rifkin & Associates	Convergence.com	Bedford, VA; Cookeville, TN; Lebanon, TN; Columbia, TN
Tennessee Cablevision	ISP Channel (SoftNet)	Oak Ridge, TN
Time Warner	Road Runner	New York, NY; Los Angeles, CA; San Diego, CA; Twin Cities, MN; Cincinnati, OH; Houston, TX; Austin, TX; Kansas City, MO; Albany, NY; Syracuse, NY; Troy, NY; Saratoga, NY; Raleigh, NC; Charlotte, NC; Akron, OH; Cleveland, OH; Columbus, OH; Youngstown, OH; Portland, ME; El Paso, TX; Oahu, HI; Austin, TX; El Paso, TX; Tampa, FL; Memphis, TN; Binghamton, NY; Corning, NY; Elmira, NY
Western Shore Cable	HSA Corp.	St. Mary's, MD

Source: Company reports and Dain Rauscher Wessels

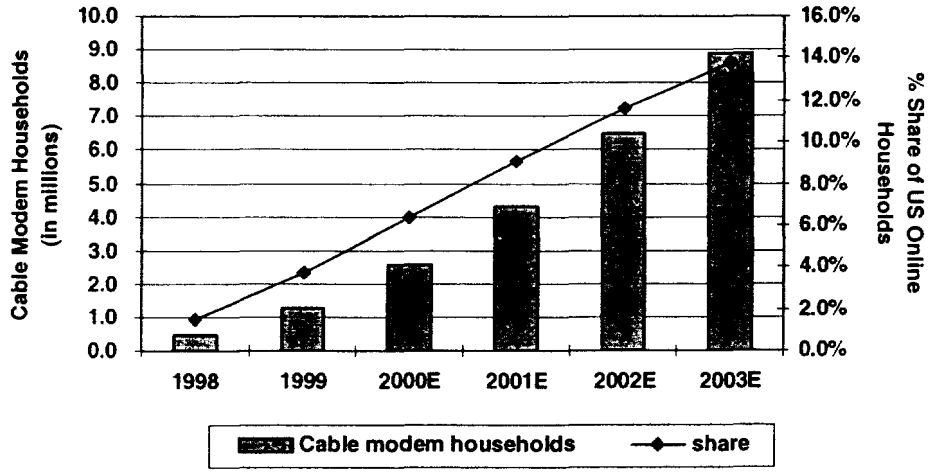
Section 7: Cable Modem Based Internet Access

◆ Cable Internet Projections

We believe that the following factors are fueling the move toward cable-based Internet access:

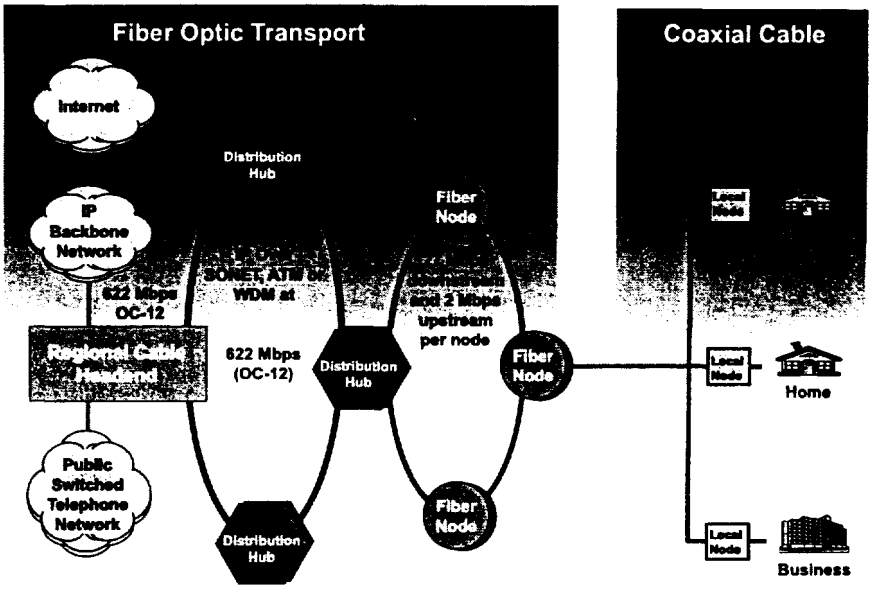
- **Revenue:** High-speed Internet access enhances the monthly revenue potential per subscriber for the cable operator. Internet access revenues are typically split between the cable operator and the cable ISP. Cable overbuilders, since they act as both the ISP and the cable operator, do not incur revenue sharing.
- **Response to DBS Threat:** DBS-based services compete directly with cable-based video offerings in terms of both content and price. By deploying two-way Internet capability, cable operators are able to add services that cannot be matched cost-effectively by DBS competitors.
- **Internet Growth:** Like all broadband access media, cable modem growth is clearly driven by the popularity of the Internet usage. This relates not simply to subscription growth, but also to the increasing usage of bandwidth fostered by complex content on the Web, including audio and video.
- **New Players:** In just the last year, the cable landscape has shifted considerably with the entry of new players. AT&T's commitment to become a leading provider of broadband services, coupled with Paul Allen's (Vulcan Ventures) and Microsoft's presence in this space, is speeding the pace of cable Internet infrastructure deployment.

Exhibit 7-5 ◆ Cable Modem Projections



Source: IDC

Exhibit 7-6 ◆ Representative Cable Internet Architecture



Source: Kinetic Strategies

◆ Cable Internet Architecture

Head-end: The head-end is the central point in a cable system. At this location, cable operators install the equipment necessary to receive video programming and the transmission equipment that sends the signals to customers' homes. In order to provide Internet access, the head-end must be upgraded with IP routers, servers, and, often, caching equipment. Head-end upgrades can cost on the order of $100,000.

Backhaul: The head-end typically is connected to the Internet via landline, wireless, or satellite data links, depending on the particular system. Depending on the system, network management tools as well as security and billing systems must be also be linked via backhaul to the head-end.

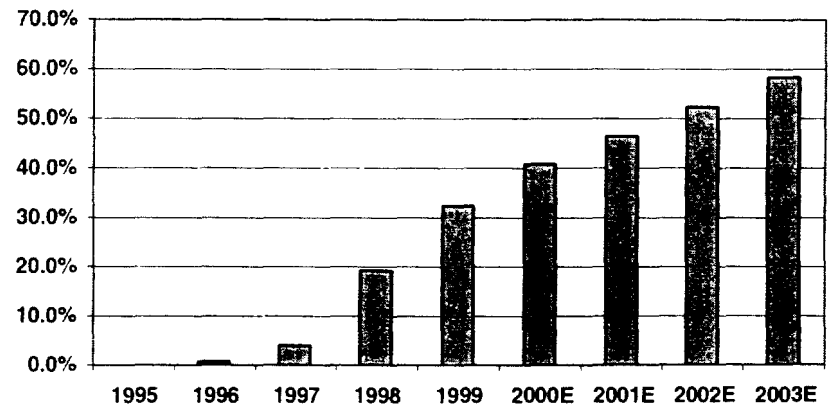
Fiber Deployment: The most common method for upgrading analog systems is to install optical fiber from the head-end to a local node. Such fiber is able to handle additional video channels and large data traffic volumes and is two-way capable.

Local Node: Typically, multiple fiber optic lines carry Internet traffic from the head-end to cable nodes in each neighborhood, which in turn connect through coaxial cable connections into the home. Cable nodes typically serve up to about 500-1,500 homes in a modern system.

Cable Modem: The cable modem acts as the physical link between the cable plant and the personal computer. The North American cable industry, in cooperation with cable modem manufacturers, adopted hardware and software interface standards known as DOCSIS to support the delivery of data services over the cable infrastructure. Adoption of this standard should contribute to lower-cost modems, less complex installation procedures, and, potentially, self installation by subscribers. Cable modem pricing is currently in the $250-$300 range, depending on the vendor.

High Throughput: While the peak data transmission speed of a cable modem is 27 Mbps downstream and nearly 1 Mbps upstream, the performance that subscribers actually experience is often constrained by the shared nature of the service. Cable Internet traffic utilizes the bandwidth of one or more 6 MHz video channels to provide downstream service from the Internet to the customer. This allows for a shared downstream bandwidth of between 27-39 Mbps, or approximately 1,000 times the speed of a 28.8 kbps analog connection. Each of the subscribers on a single fiber node shares this bandwidth, so cable ISPs are generally not able to guarantee throughput levels. Upstream traffic is generally handled on a portion of the cable spectrum not used for video service (5-42 MHz range) and is slower—usually not more than 768 kbps upstream—than downstream speeds but often on par with or faster than ISDN speeds of 128 kbps. In some markets, cable ISPs limit users' upstream bandwidth usage or charge extra for heavy upstream traffic in order to manage system resources. Availability of upstream transmission on the cable plant depends on the individual operators' plant upgrade programs. Roughly 40% of the cable plant in the United States is two-way capable today.

Exhibit 7-7 ◆ Cable System Upgraded for High-Speed Internet Access



Source: IDC

Always-On Connection: Like other broadband services, most two-way cable Internet systems keep the customer's connection active even during idle periods. Thus, users who leave their PCs switched on can instantly access the Web without having to experience the dial-up or logon delays of conventional Internet services.

One-Way Services: Some cable Internet deployments use an approach known as *one-way with telco return*, in which the cable plant carries the downstream traffic, and conventional telephone lines are used for the upstream traffic. This approach, besides offering lower upstream speeds than full two-way deployments, ties up the user's existing phone line or requires the installation of a second phone line, thereby increasing the monthly cost of the service. As such, one-way cable Internet services are seen by most operators and ISPs as an interim solution along the path to full two-way capability.

Caching and Content Delivery: Most cable ISPs incorporate caching technology at the head-end servers to reduce the time and cost associated with transporting popular content repeatedly across the Internet.

Exhibit 7-8 depicts representative unit economics of a cable ISP and cable overbuilder. As mentioned earlier, a cable ISP typically splits revenue with the cable operator, and, depending on the arrangement, may share in the upgrade expenditures. A cable overbuilder controls the entire connection from the Internet to the customer and thus does not incur a revenue share.

Exhibit 7-8 ◆ Cable Internet Unit Economics

Assumptions:	Cable ISP	Cable Overbuilder
Homes per head-end	60,000	40,000
Voice penetration per customer	0%	75%
Fixed costs		
Two-way upgrade (one-time)	$2,400,000	$20,000,000
Router, Other equipment cost (one-time)	70,000	70,000
Total fixed costs (network capex)	**$2,470,000**	**$20,070,000**
Semi-fixed costs		
Customer acquisition cost (one-time)	100	100
Customer premise equipment (one-time)	425	425
Gross semi-fixed costs (subscriber acquisition cost)	**$700**	**$700**
Revenue from customer premise equipment (one-time)	(200)	(200)
Revenue from installation fee (one-time)	(100)	(100)
Net semi-fixed costs (subscriber acquisition costs)	**$400**	**$400**
Variable costs		
Backhaul, power (monthly)	$1,500	$1,500
Recurring monthly revenue per customer	**$40**	**$110**
Share of recurring monthly revenues	$20	$110
Customer revenue margin	**$20**	**$110**
Breakeven (customers)	**8,501.4**	**5,573.3 ***
Breakeven (penetration)	**14.2%**	**13.9% ***

* capital expenditures amortized over 36 months

Source: Dain Rauscher Wessels

◆ Cable Broadband Regulation

The 1996 Telecom Act affects the cable industry in the following ways:

- Telephone companies are allowed to provide cable TV service in their local telephone service areas if they agree to provide interconnection for local telephone service to the local cable television operator. To date, this has been done on a relatively limited scale, with Ameritech being the notable exception (Ameritech has deployed cable systems in several Midwest markets).
- Cable operators are permitted to provide local telephone service in their franchise areas through their facilities or as resellers of the current local provider's services. AT&T, Cablevision Systems (NYSE: CVC; Strong Buy-Average; $62.81), Comcast, Cox, and Time Warner are among the major cable operators that provide local telephone service over their own facilities.
- A cable television operator may own up to 10% of the local exchange carrier, and the LEC may, in turn, own up to 10% of the local cable television operator in the same service area.

At present the key regulatory debate pertaining to cable Internet service relates to open access to the cable infrastructure for multiple ISPs. Currently, exclusive arrangements exist between cable ISPs, such as Excite@Home and cable operators, such as AT&T, to offer Internet service over the cable plant. With the expiration of most of these agreements in the 2001-2003 time frame, many cable ISPs and operators have announced the extension of their contracts but eliminated the exclusivity provisions.

The open access issue originated at the local level in 1999 in conjunction with franchise renewal and transfer proceedings. Although it is likely that lengthy court proceedings will accompany this issue over the coming quarters, we believe that as a practical matter, it is unlikely to lead to the mandated unbundling of the cable plant for several reasons. First, the cable plant has never fallen under the same common carrier classification as the telephone network, and to place both systems on parity by "regulating up," or imposing more regulation on the cable side, goes against the grain of current FCC thinking. Second, the FCC's primary policy objective of fostering broadband competition in the consumer market, which is currently taking place between cable and DSL-based providers, could be delayed if cable companies lose incentive to upgrade to two-way capability. Cable unbundling entails a host of technical complexities and capital outlays to be borne primarily by cable operators.

◆ Current Limitations of Cable Internet Services

Upgrade Requirements: Significant investment still is required to upgrade many cable systems for broadband compatibility. This expense is usually borne by the cable operator alone, although some ISPs offer financial incentives to operators to upgrade their plant and sign on Internet subscribers.

Back-Office Coordination: Since the cable ISP and the cable operator are usually separate companies (except in the case of cable overbuilders), significant coordination is required between both parties to effectively deliver and bill for service.

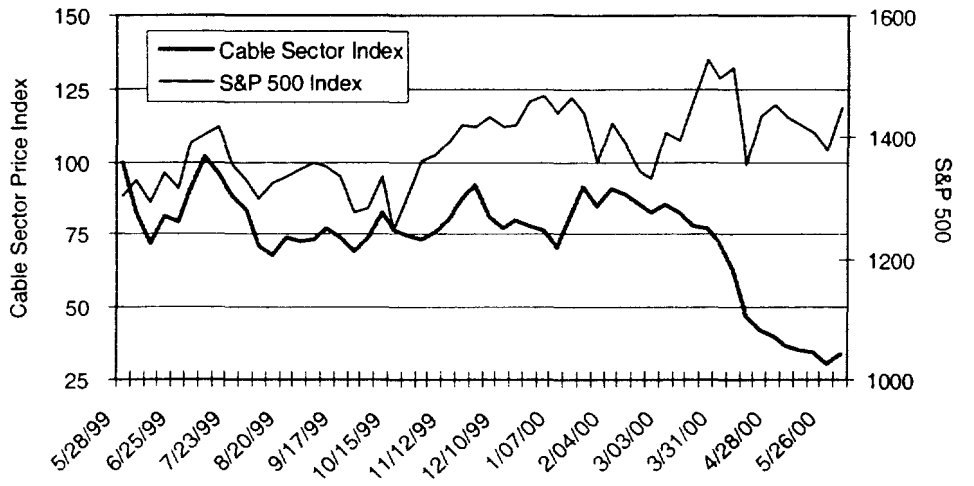
Limited Reach to Businesses: Although cable systems collectively pass 95% of homes in the United States, they generally do not extend to businesses. To reach this sizeable market with two-way capable, upgraded facilities, cable operators or ISPs would have to incur significant additional capital outlays or find other means, such as wireless, DSL, or fiber, to reach businesses. Business services would represent an effective complement to residential service as a significant amount of bandwidth goes unused during daytime hours.

Shared Medium: Unlike other networks in which a user is allocated a dedicated connection, cable modem users do not occupy a fixed amount of bandwidth. Instead, they share the network with other active users and use the network's resources only when they actually send or receive data. Thus, Internet access speeds vary depending on how many users are using the connection at any one time and can slow appreciably during peak usage periods. To increase shared capacity and alleviate congestion, cable operators can perform node segmentation, which effectively limits the number of homes that share a single 6 MHz channel.

Provisioning Complexity: Obtaining a cable connection to the Internet entails making an appointment for installation and, often, opening up one's PC for Ethernet card installation. Cable modem products offering Universal Serial Bus (USB) connections to USB-enabled PCs should simplify the installation process and facilitate self-installation.

Network Security: Cable is a shared medium, unlike other technologies such as dial-up and DSL that offer a dedicated connection for each user. Such a shared medium poses security issues with respect to data interception, "packet sniffing," and hacking from other users along the same neighborhood network.

Exhibit 7-9 ◆ Cable Broadband Price Index vs. S&P 500



Source: Dain Rauscher Wessels

Exhibit 7-10 ◆ Publicly Traded Cable-Based Broadband Providers

(Amounts in millions, except per share figures)

			Stock Price Information						Balance Sheet					Revenue			
Company	Symbol	FYE	Price 06/01/00	52 Week Range High	52 Week Range Low	Shares Out.	FD Shares Out.	Market Cap.	Long Term Debt	Preferred Stock	Cash	Enterprise Value	CY 2000	CY 2001	FY 2001	Enterprise Value / Rev. CY 2000	Enterprise Value / Rev. CY 2001
Excite@Home	ATHM	Dec	$20.50	$61.13	$15.88	395.19	395.19	8,101	$832	$409	$502	8,840	$420	$723	$1,310	12.2 x	6.7 x
High Speed Access Corp.	HSAC	Dec	4.97	49.19	4.16	54.28	55.67	277	12	0	179	109	3	14	67	7.9 x	1.6 x
RCN Corporation	RCNC	Dec	23.38	74.88	18.50	76.32	81.14	1,897	2,143	253	1,816	2,477	336	382	522	6.5 x	4.7 x
SoftNet Systems, Inc.	SOFN	Sep	11.69	50.25	8.38	26.66	26.72	312	12	0	251	74	5	16	NA	4.7 x	NM
WorldGate Communications, Inc.	WGAT	Dec	15.31	55.75	13.00	21.49	21.55	330	0	0	76	255	6	19	67	13.4 x	3.8 x

Source: FactSet

Section 7 – Cable-Modem-Based Internet Access

Broadband Services Companies	Hyperlink	Description	Address	Financial & Strategic Partners	Ticker
Excite@Home	www.excite@home.com	Excite@Home is provider of broadband internet services, content and advertising over the cable television infrastructure. Its primary offering, the @Home service, allows residential subscribers to connect their personal computers through the cable television infrastructure to the company's high speed Internet backbone network. The company's @Work service provides a platform for the Internet and VPN connectivity for business over the cable infrastucture as well as DSL networks, in partnerships with AT&T, NorthPoint Communications and Rhythms NetConnections.	450 Broadway Street Redwood City, CA 94063	AT&T, Comcast, Cox, Cablevision	ATHM
High Speed Access Corp.	www.hsacorp.net	High Speed Access Corp. is a provider of high-speed Internet access via cable modem. The company's partners with exurban cable operators to enable subscribers – residential and commercial end users – to receive high-speed Internet access and enhanced services.	4100 East Mississippi Denver, CO 80246	Broadband Solutions, Vulcan Ventures, Chysalis Ventures, River Cities Capital, Cisco Systems, Com21, Microsoft Corp.	HSAC
RCN Corporation	www.reliantenergy.com	RCN Corporation is a facilities-based provider of bundled local and long distance phone, cable television and high-speed Internet services in dense residential markets. RCN is currently delivering broadband services over its networks in the Boston-Washington corridor, California, and Chicago.	105 Carnegie Center Princeton, NJ 08540	Level 3, Vulcan Ventures, Hicks Muse Tate & Furst.	RCNC
SoftNet Systems	www.softnet.com	Through its ISP Channel, SoftNet provides high-speed Internet access service with partnering cable operators. SoftNet's Intellicom subsidiary provides two-way satellite-based broadband services to schools, government institutions, and businesses. The company's SoftNet Zone unit provides Internet access to business travelers in airports and other public-access venues using wireless LAN technology and conventional wired T1 services.	650 Townsend Street Suite 225 San Francisco, CA 94103-4908	RGC International Investors, White Rock Capital, Stark International, CMGI, Compaq, Delta Airlines	SOFN
Worldgate Communications	www.wgate.com	WorldGate provides high-speed services that enable cable subscribers to access the Internet and e-mail on their cable television sets. The company is currently deployed domestically in several cable systems and has international deployment and trial agreements with 21 multiple system operators in 13 countries worldwide.	3190 Tremont Ave Trevose, PA 19053	Citicorp	WGAT
Carolina Broadband	www.carolinabroadband.com	Carolina BroadBand, a cable overbuilder, is targeting initially twelve markets in North Carolina and South Carolina to provide broadband Internet, video, streaming media, and voice services to residences and businesses.	9601-M Commons East Dr. Charlotte, NC	First Union Capital Partners, Bank of America Capital Investors, Carousel Capital, M/C Venture Partners, MSDW Private Equity, Chase Capital Partners, Providence Equity Partners, Spectrum Equity Associates, Fleet Equity Partners, HarbourVest PArtners LLC, Whitney & Co.	private

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Broadband Services Companies	Hyperlink	Description	Address	Financial & Strategic Partners	Ticker
Digital Access, Inc.	www.digaccess.com	Digital Access is building a broadband fiber/hybrid coa network in four markets: Indianapolis, Kansas City, Milwaukee, and Nashville. The company's network will offer business and residential customers access to local and long distance voice, digital television, and high-speed Internet access services.	3 Bala Plaza East Bala Cynwyd, PA 19004	Norwest Venture Partners, Bachow & Associates, California State Teachers Retirement System, Cornerstone Equity Investors, LLC, First Union Capital Partners, Fleet Equity Partners, Goldman Sachs Group, M/C Venture Partners, Providence Equity Partners, Spectrum Equity Partners	private
Knology	www.knology.com	KNOLOGY is a provider of bundled broadband communications services, including cable TV, telephone and high-speed Internet access, in the Southeast to residential and business customers. KNOLOGY is part of the ITC group of companies, which includes ITC DeltaCom, Powertel and InterCall.	1241 O.G. Skinner Drive West Point, GA 31833	ITC Holding Company	private
Road Runner	www.rr.com	Road Runner is a joint venture among cable MSO affiliates Time Warner and MediaOne Group as well as Microsoft, Compaq, and Advance/Newhouse. Road Runner cable modem service is delivered through a combination of the networks and technologies of Road Runner and its affiliated cable operators. Road Runner affiliated systems pass approximately 30 million homes.	13241 Woodland Park Rd. Herndon, VA 20171	Time Warner, MediaOne, Microsoft, Compaq, Advance/Newhouse	private
Seren Innovations	www.seren.com	Seren Innovations, a cable overbuilder, provides cable televsion, telephone, and high-speed Internet access over a hydrid fiber-coax infrastructure to residences and businesses. The company is licensed to provide these services in several markets in California and Minnesota.	15 South 5th Street Minneapolis, MN 55402	Northern States Power	private
Western Integrated Networks	www.winfirst.com	Western Integrated Networks is a cable overbuilder that is establishing a presence in California, Texas, and other markets. The company's offerings include voice, Internet, data, portal, and digital cable services.	Colorado Center Tower Two 2000 South Colorado Boulevard Suite 2-670 Denver, CO 80222	J.P. Morgan, First Union Capital, Madison Dearborn, Columbia Capital, Providence Equity, and The Blackstone Group.	private
WideOpenWest	www.wideopenwest.com	WideOpenWest is a cable overbuilder that is deploying a broadband infrastructure for Internet, digital cable television and IP telephony services in the several markets in the Western U.S. The company's network is intended to be an open platform for its own brand of Internet service, as well as for the services of competing ISP's on an open access non-discriminatory basis. The company plans to begin service in the metropolitan areas of Colorado, Oregon, Texas, and other markets this year.	10475 Park Meadows Drive Sixth Floor Littleton, CO 80124	Oak Hill Capital Partners, ABRY Partners	private

Section 8:
Building-Centric Service Providers (BSPs)

Section 4: Building-Centric Service Providers (BSPs)

Broadband services are becoming a key component of value for commercial and residential properties. As real estate stakeholders rush to meet the demands of commercial and residential tenants, carriers are stepping up to the plate with a new generation of convergence products, engineered to distribute voice, data, and enhanced services to multi-tenant properties. Recently, a new crop of broadband service providers has emerged to meet tenant demand for building-focused broadband services. Although the term "BLEC" is occasionally used to identify these carriers, we prefer to use the term BSP (building-centric service provider), as there is no requirement these companies carry LEC (local exchange carrier) status.

Fueling the BSP trend are the incentives that real estate owners have to increase property values and to take advantage of more favorable REIT (real estate investment trust) regulations through equipping their properties with broadband facilities. This is evidenced by the numerous REITs and REOCs (real estate operating companies) that have announced broadband initiatives. The BSP strategy is to offer high-speed Internet access (and, in some cases, voice services), data networking, Web hosting, and enhanced services such as e-commerce and network-delivered applications to multi-tenant and/or hospitality properties.

This approach is similar to that taken by other competitive providers; however, it differs in execution due to the BSPs' strategic relationships with property owners, and the "pre-provisioned" nature of service installation (no truck roll required) to individual suites. In addition, as distinct from many other local competitors, BSPs often lease rather than construct much of their last-mile and backbone infrastructure (at least initially).

Multi-tenant unit (MTU) office properties are an obvious potential market for the BSPs; however, significant opportunities extend into additional types of real estate, such as multi-dwelling unit (MDU) residential properties, hotels, and public access environments. In this chapter, we consider four vertical markets targeted by BSPs:

- multi-tenant commercial properties (or MTUs, multi-tenant units);
- multiple-dwelling units (MDUs);
- lodging; and
- public access (airports, convention centers, and so forth) for business travelers.

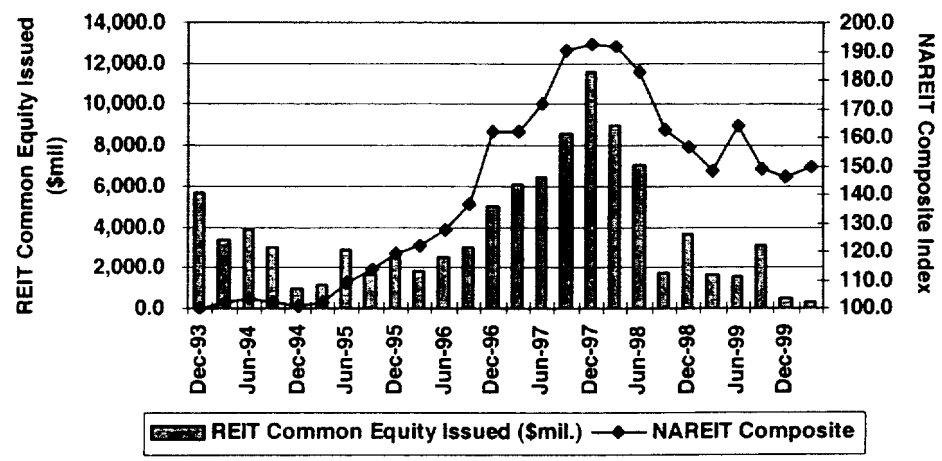
We recognize that the dividing line between these segments is occasionally blurred, and in fact many companies in this emerging sector are addressing multiple segments. In addition, not to be overlooked is the fact that many fiber-based and broadband wireless competitors (such as Intermedia Communications, Inc. (Nasdaq: ICIX; Not Rated) Time Warner Telecom, NEXTLINK Communications, Inc., WinStar Communications, Teligent, and Advanced Radio Telecom) have significant building-centric elements to their business models. Nevertheless, as we describe below, BSPs have several common features in their business models that distinguish them from these other classes of competitor and that warrant treating them as a separate category.

◆ A Brief Primer on Real Estate

Real estate development is a complex business, with numerous entitlement processes, financial partners, public agencies, private entities, and management teams to deal with. Combined, these factors present a formidable barrier to competitive providers who wish to serve this market. As discussed in Section 3, the 1996 Telecommunications Act prohibits exclusive service agreements between broadband providers and real estate developers in commercial buildings. However, service providers and developers are frequently willing to enter into exclusive or preferred marketing deals. The following discussion highlights some of the events that have helped create the current opportunity for building-centric broadband service providers.

Despite strong tenant demand, the real estate market became increasingly competitive in the late 1990s, largely due to an increase in supply in most property sectors. As access to capital became tight for property owners, property-level revenues (as opposed to acquisitions) were the primary source of earnings growth for most property owners. Given this circumstance, coupled with greater tenant demand for broadband services, the role of the commercial real estate owner evolved in a new direction. REITs, as well as public and private real estate operating companies (REOCs), embraced telecom as a means to further enhance property values and tenant retention.

Exhibit 8-1 ◆ REIT Total Returns and Common Equity Issued



Source: National Association of Real Estate Investment Trusts

Broadband Deployment: More favorable REIT regulations helped spur broadband deployment. In January 1999, Equity Office Properties Trust, an office REIT, received a ruling from the IRS that allowed the company "to participate in the delivery of advanced telecommunication services to its customers without violation of current REIT rules." According to the ruling, revenue generated by Equity Office from telecommunication services would be deemed "rents from real property." By way of background, REITs must derive at least 75% of gross income from rents from real property, interest on mortgages on real property, or dividends from REIT shares. More recently, the REIT Modernization Act (RMA), passed in December 1999, provides REITs with greater latitude to generate income that is not derived from "rents on real property." Simply put, REITs can more aggressively provide non-core services to tenants without jeopardizing their REIT status.

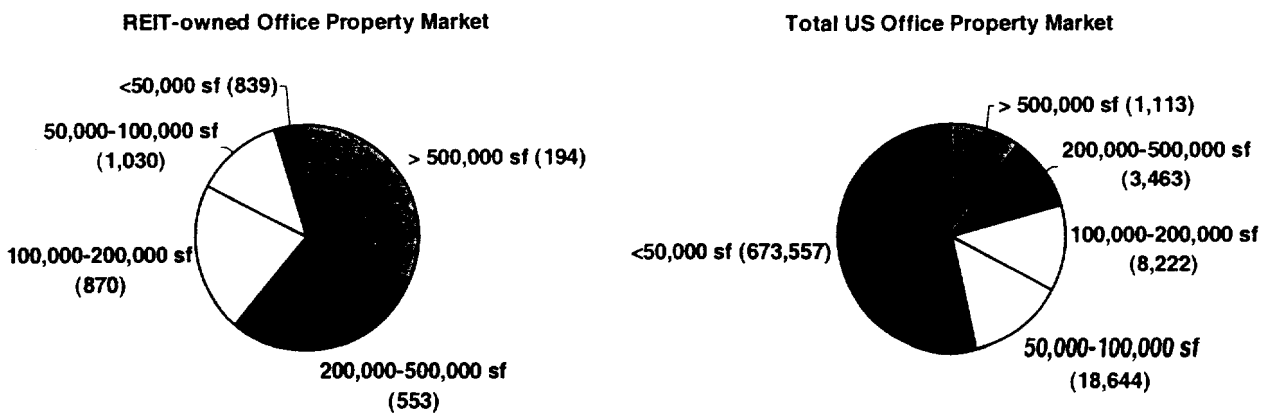
The Land Grab for Building Access: Prior to deploying an in-building broadband network, a BSP must secure access rights from the real estate owner in order to install and operate the proprietary networking equipment. The typical license and access agreement has an initial term ranging from five to ten years, with five- to fifteen-year renewal options. These agreements may also provide for a marketing arrangement, in which the property owner recommends the BSP's telecommunication services to existing or prospective tenants. Typically, BSPs target property interests, such as REITs, REOCs, property managers, real estate agents, as well as pension funds and insurance companies that own commercial real estate to form strategic relationships. These relationships have often included BSP warrant issuances to the property interests in exchange for building access rights.

Although building access rights initially create a captive pipeline for BSPs to install their in-building network, the onus is on the BSP to install its network on a timely basis, since other BSPs are likely to have building access rights, given the non-exclusive nature of most agreements. For instance, hotel operators, such as Marriott International and Hilton Hotels, often do not own all of their branded-properties. Therefore, separate agreements with the property owner may be necessary, despite being the preferred high-speed access provider of a hotel chain. We outline several major BSP-real estate relationships in the following sections of this report, organized by vertical market segment.

◆ Multi-Tenant Unit (MTU)—Office BSPS

Traditional telecommunication service providers have typically overlooked small and medium-sized businesses that are located in MTUs. According to the U.S. Department of Energy, the commercial office market consists of approximately 705,000 properties, totaling 10.5 billion square feet. Based on the U.S. Department of Energy and SNL Securities, we conservatively estimate that there are close to 32,000 commercial office properties in the U.S. larger than 50,000 square feet. All told, this adds up to an estimated market opportunity on the order of $10 billion. To address the need for broadband services, BSPs install their own in-building infrastructure and attempt to be a complete provider of bundled services.

Exhibit 8-2 ◆ National Commercial Office Market



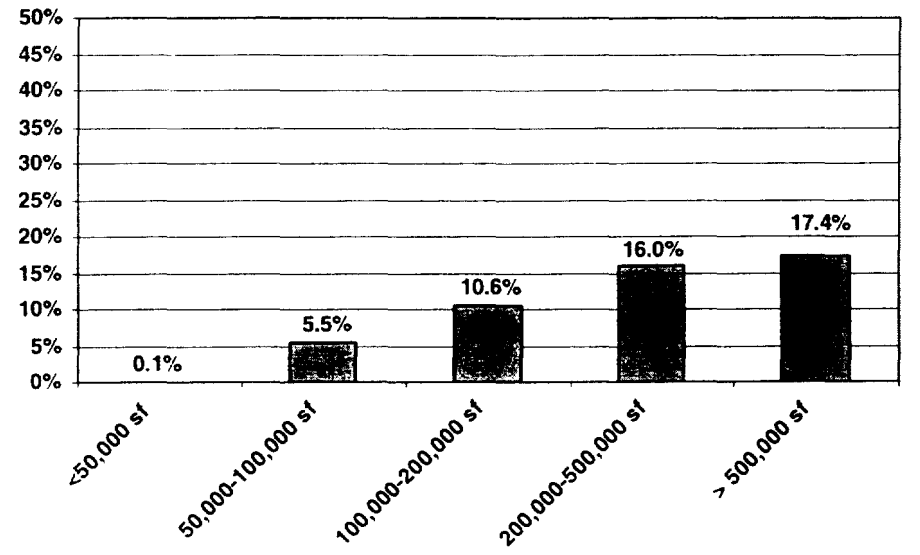
Note: Parenthetical figures refer to estimated number of buildings within each category.

Source: Dept. of Energy and Dain Rauscher Wessels

Source: Dain Rauscher Wessels estimates

In order to deploy their in-building networks, we believe that many BSPs are more likely to initially target office buildings greater than 50,000 square feet, given the economies of scale that larger properties afford. Accordingly, we believe that their strategic relationships with commercial real estate owners create a captive pipeline for BSPs in a relatively attractive segment of the commercial real estate market. As illustrated in **Exhibit 8-3,** REIT portfolios consist of larger properties relative to the national office market. Overall, we estimate that REITs own approximately 0.5% of total U.S. commercial office properties, representing 5.4% of total square footage. More specifically, we estimate that REITs own significantly less than 1% of properties with less than 50,000 square feet; meanwhile. This ownership increases to 16.0% and 17.4% of commercial office buildings that encompass 200,000-500,000 square feet and over 500,000 square feet, respectively. We believe the significance of the BSP relationships would be even more evident if the real estate portfolios of several of the major REOCs, such as Tishman-Speyer, Fisher Brothers, TrizecHahn, and Trammel Crow were considered; however, much of this data was unavailable during our analysis.

Exhibit 8-3 ◆ REIT Ownership as a Percentage of the Total U.S. Office Market



Source: Dain Rauscher Wessels

Typical Building-Centric Network Architecture: Although currently available "last-mile" technologies can deliver high-speed data from a local central office to the edge of the building, this does not fully solve the issue of competitive access to tenants inside a commercial building. Traffic must still move from the edge of the building to an end user's LAN, PBX, telephone, or PC over the building's internal network. Historically competitive providers have connected building tenants to their networks by way of the existing in-building wiring, often constructed and owned by the ILEC, through a network interface device typically located in the building basement.

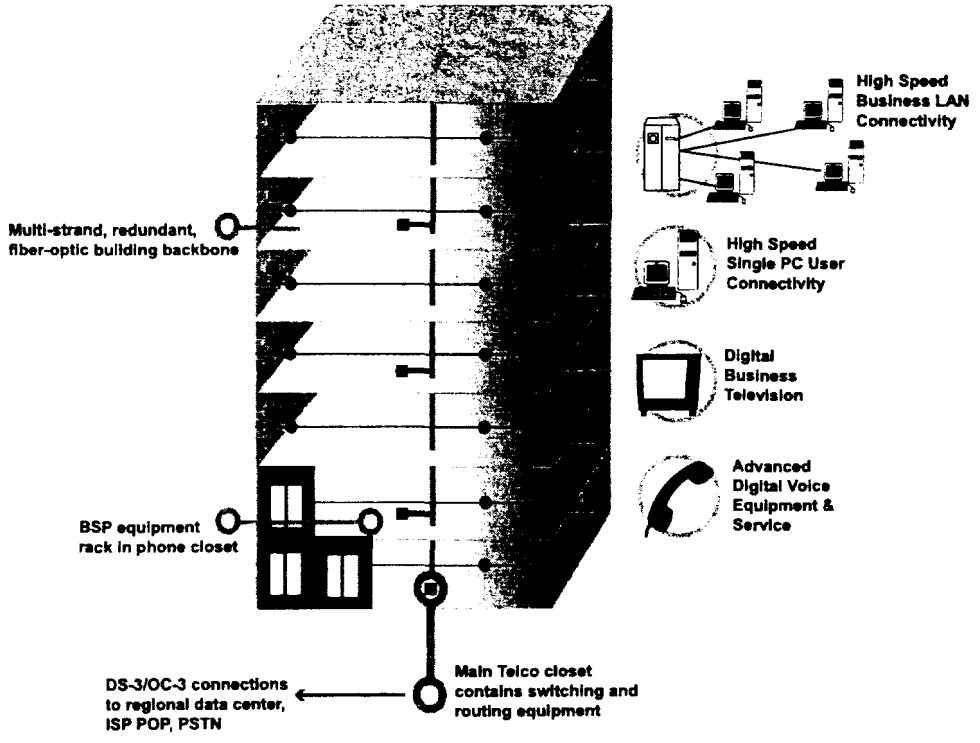
Section 8: Building Owner Service Providers (BSPs)

As a result of numerous factors, including:

- the bandwidth limitations frequently found in existing in-building wiring;
- the desire to provide network control all the way to the tenant site and not rely on third-party facilities in the building; and
- the desire to offer bundled voice, data, Internet, hosting, and other services;

BSPs install their own telecommunications equipment in the basement phone closet and either speed up the existing copper connections using DSL technology, or run their own combination of fiber, coaxial cable, and clean copper through the building's vertical utility shafts (referred to as "risers") to reach individual business tenants. This is illustrated in **Exhibit 8-4**.

Exhibit 8-4 ◆ Typical BSP Network for Multi-Tenant Commercial Buildings



Source: Dain Rauscher Wessels

Section 8: Building-Centric Service Providers (BSPs)

The basement point of presence (POP) is customized according to the BSP's specific needs and contains data networking and voice communications (depending on the carrier) equipment as well as primary and back-up power supplies. These features allow the BSP to manage in-building networks and facilities independent of the ILEC. The copper, coaxial, and/or fiber-optic cabling installed in the served buildings extends from the basement POP to a termination block on each floor. When a tenant on a particular floor requests service, a technician extends a connection from the floor termination block to the business premise. Having each tenant essentially pre-provisioned eliminates costly service installation procedures such as truck rolls.

BSPs usually outsource in-building construction to contractor partners. The time required to deploy a building network can range from approximately two weeks to two months, depending on the size and type of property as well as the capital intensity of the BSP's network model. As noted earlier, some BSPs choose to utilize existing building copper and enhance it using DSL, while others choose to run their own cabling through the risers. Accordingly, deployment expenditures per building can vary widely, from roughly $30,000 to more than $200,000. In general, carriers use the "DLSAM in the basement" approach to achieve a more rapid time to market or to target buildings with a smaller tenant base.

To communicate with the PSTN, Internet, or other networks, the BSPs connect their building POPs via high-capacity lines (usually leased from a LEC) to a telco central office or metro-area data center, depending on the nature of the traffic. BSPs that do not operate their own hosting or wide-area network infrastructure provide these services on a private-label basis.

Strategic Partnerships for Building Access: Before wiring a building, BSPs must enter into agreements with property owners and operators to gain access rights. Examples of the many strategic agreements that have been reached between BSPs and real estate groups are shown in **Exhibit 8-5.**

Exhibit 8-5 ◆ BSP-Real Estate Partnerships in the Multi-Tenant Office Sector

BSP	Real Estate Partners/Strategic Alliances	Company Type
Allied Riser	Angelo, Gordon & Co.	Office Property Manager
	Amerimar Enterprises	Office Property Manager
	Berwind Property Group	Diversified Property Owner
	Boston Properties	Office REIT
	Cornerstone Properties *	Office REIT
	Equity Office Properties Trust	Office REIT
	Fisher Brothers	Office Property Owner and Manager
	Hamilton Partners	Office Property Owner and Manager
	The Hines Organization	Office Property Owner and Manager
	Leggat McCall Properties LLC	Office Property Owner and Manager
	MetLife	Office Property Owner and Manager
	Minshall Stewart Shelby and Co.	Diversified Property Owner
	Pope and Land Enterprises, Inc.	Office Property Developer
	Rubenstein and Company, LP.	Commercial Real Estate Service Provider
	Shorenstein Company	Commercial Real Estate Service Provider
	Tishman Speyer	Office Property Owner and Manager
	Transwestern	Office Property Owner and Manager
	TrizecHahn Corporation	Office Property Owner and Manager
	Urdang & Associates Real Estate Advisors, Inc.	Commercial Real Estate Service Provider
	Vornado Realty Trust	Office/Retail REIT
	Whitehall Funds	Diversified Property Owner
Broadband Office	CarrAmerica Realty Corporation	Office REIT
	Crescent Real Estate Equities	Office REIT
	Duke-Weeks Realty Corp.	Office REIT
	Equity Office Properties Trust	Office REIT
	Highwoods Properties, Inc.	Office REIT
	The Hines Organization	Office Property Owner and Manager
	Mack-Cali Realty Corporation	Office REIT
	Spieker Properties, Inc.	Office REIT
Cypress Communications	Aldrich, Eastman and Waltch	Diversified Property Investor
	Boston Properties	Office REIT
	Brookfield Properties	Office Property Owner and Manager
	Boxer Property	Office Property Owner and Manager
	Cornerstone Properties *	Office REIT
	Cousins Properties	Office REIT
	Lend Lease	Commercial Real Estate Service Provider
	Pope & Land Enterprises, Inc.	Office Property Developer and Manager
	Shorenstein Company	Commercial Real Estate Service Provider
	Taylor & Mathis, Inc.	Office Property Manager
	Taylor Simpson	Commercial Real Estate Service Provider
	Tower Realty	Office REIT
	Transwestern	Office Property Owner and Manager
	TrizecHahn Corporation	Office Property Owner and Manager
	Vornado Realty Trust	Office/Retail REIT
Darwin Networks	MacFarlan Real Estate	Office Property Owner and Manager
	Koulter Property Management	Office Property Owner and Manager
eLink Communications	Jones Lang LaSalle	Commercial Real Estate Service Provider
	TrizecHahn Corporation	Office REOC
Eureka Broadband	Arden Realty, Inc.	Office REIT
	Max Capital Management	Office Property Owner and Manager
Everest Broadband Networks	Cohen Brothers Realty Corp.	Office Property Owner and Manager
	Muss Development Company	Office Property Owner and Manager

* Cornerstone Properties is being acquired by Equity Office Properties Trust.

Source: Company reports and Dain Rauscher Wessels

Exhibit 8-5 ◆ BSP-Real Estate Partnerships in the Multi-Tenant Office Sector, continued

BSP	Real Estate Partners/Strategic Alliances	Company Type
Eziaz	Berwind Property Group	Diversified Property Owner
	Catellus Development	Diversified Property Owner and Manager
	DLJ Real Estate Capital Partners	Diversified Property Owner
	Glenborough Realty Trust	Office, Hotel and Multi-Residential REIT
	Insignia Financial Group	Commercial Real Estate Service Provider
	The Irvine Company	Master Planned Community Developer
	Jones Lang LaSalle	Commercial Real Estate Service Provider
	Koll Development Company	Diversified Property Developer
	Layton-Belling	Commercial Real Estate Service Provider
	Olen Properties	Office and Multi-Residential Property Owner
	Paramount Group	Commercial Real Estate Service Provider
	Parkway Properties	Office REIT
	PM Realty Advisors	Commercial Real Estate Service Provider
	RM Crowe Property Management	Office/Residential Property Owner and Manager
	Rubenstein and Company, LP.	Commercial Real Estate Service Provider
	SKB	Commercial Real Estate Service Provider
	Taylor Simpson Group	Commercial Real Estate Service Provider
	Tishman Speyer	Office Property Owner and Manager
	Vornado Realty Trust	Office/Retail REIT
	JMB/Walton Street Capital	Diversified Property Investor
Fibernet Telecom Group	Tishman Speyer	Office Property Owner and Manager
Intellispace	Abramson Brothers Incorporated	Office Property Owner and Manager
	ATCO Properties and Management	Office Property Owner and Manager
	Bernstein Real Estate	Office Property Owner and Manager
	Brause Realty	Office Property Owner and Manager
	Cushman and Wakefield	Commercial Real Estate Service Provider
	Dakota Realty	Office Property Owner and Manager
	Falcon Properties	Office Property Owner and Manager
	GVA Williams	Office Property Owner and Manager
	Helmsley-Spear	Office Property Owner and Manager
	Jeffrey Management	Office Property Owner and Manager
	Jones Lang LaSalle	Office Property Owner and Manager
	Justin Management	Office Property Owner and Manager
	The Lincoln Building	Office Property Owner and Manager
	Max Capital Management	Office Property Owner and Manager
	Olympic Tower Associates	Office Property Owner and Manager
	Orda Management	Office Property Owner and Manager
	Rudin Management @ 55 Broad Street	Office Property Owner and Manager
	Sherwood 1600 Associates	Office Property Owner and Manager
	Taconic Investment Partners	Diversified Property Investor
	Tower 49®	Office Property Owner and Manager
	W and M Properties	Office Property Owner and Manager
	W and M Properties of Connecticut	Office Property Owner and Manager

Source: Company reports and Dain Rauscher Wessels

Exhibit 8-5 ◆ BSP-Real Estate Partnerships in the Multi-Tenant Office Sector, continued

BSP	Real Estate Partners/Strategic Alliances	Company Type
OnSite Access	Angelo, Gordon & Co.	Office Property Owner and Manager
	Blumberg & Freilich Equities Properties	Office Property Owner and Manager
	Brannen Goddard Co.	Office Property Owner and Manager
	The Brookdale Group LLC	Office Property Owner and Manager
	Childress Klein Properties	Office Property Owner and Manager
	Cummings Properties	Office Property Owner and Manager
	Devnet	Commercial Real Estate Service Provider
	Emmes Realty Services	Commercial Real Estate Service Provider
	Equity Office Properties Trust	Office REIT
	Insignia Financial Group	Commercial Real Estate Service Provider
	JMB/Walton Street Capital	Diversified Property Investor
	John. K. Akridge Companies	Office Property Owner and Manager
	Legacy Partners Commercial	Commercial Real Estate Service Provider
	Lend Lease Real Estate Investments	Diversified Property Investor
	Newmark & Co. Real Estate, Inc.	Office Property Owner and Manager
	Oxford Properties Group Inc.	Office Property Owner and Manager
	The Parmenter Company	Office Property Owner and Manager
	Praedium Funds	Diversified Property Investor
	Prime Group Realty	Office REIT
	Reckson Associates	Office REIT
	Regent Partners	Office Property Owner and Manager
	SL Green Realty	Office REIT
	Starwood Capital Group Properties	Diversified Property Owner and Manager
	The Taylor Simpson Group	Commercial Real Estate Service Provider
	Tishman Speyer	Office Property Owner and Manager
	TMW Real Estate Group	Office Property Owner and Manager
	Tower Realty Management Corp.	Office Property Manager
	Transwestern	Office Property Owner and Manager
	TrizecHahn Corporation	Office Property Owner and Manager
	The Witkoff Group	Office Property Owner and Manager
Tenant Connect	Arden Realty	Office REIT
Urban Media	Jones Lang LaSalle	Commercial Real Estate Service Provider
	Liberty Property Trust	Office REIT
	Pinnacle Properties	Office Property Owner and Manager
	Prentiss Properties Trust	Office REIT
	Trammell Crow Company	Office Property Owner and Manager

Source: Company reports and Dain Rauscher Wessels

Real estate owners affiliate with BSPs for the following reasons:

- **No-Cost Technology Upgrades:** BSPs usually install, at no direct monetary cost to the real estate owner, an in-building broadband network that becomes an amenity to the building and could increase the property's value.
- **Marketing and Leasing Amenity:** An in-building broadband network represents a significant marketing and leasing amenity to attract and retain tenants and guests. Over time, we expect most commercial properties to offer broadband access; therefore, we expect marginal benefit in the long run for a property that sports broadband access.
- **Recurring Incremental Revenue:** Building access agreements often provide real estate owners with the opportunity to participate in the telecommunications and even e-commerce service revenues within their buildings. A revenue share to the owner of commercial office space can be in the range of 5%-7%.
- **Equity Consideration:** As noted earlier, it is not uncommon for real estate owners to receive warrants or other equity-related incentives in exchange for providing preferred building access to BSPs.

BSP Regulation: Building Access Rights

The telephone closets in many buildings tend to be small facilities that were constructed many years ago for a monopoly service provider. Although CLECs can gain access to these facilities through the interconnection obligations of the 1996 Telecommunications Act, there are considerable physical limitations on how much proprietary telecommunications equipment a typical building can accommodate. Under current FCC regulations, commercial real estate owners have the right to control wiring within their premises, beyond the demarcation point (typically the phone closet) at which telecommunication carriers typically terminate their facilities. These rules allow the property owners to install and maintain their own wire, or to contract these services to other companies. Currently, there is no national requirement that property owners or managers give access to competitive telecommunications providers of communication services, but some such measures have been adopted at the state level. For instance, state laws in Connecticut and Texas generally require commercial real estate owners to provide nondiscriminatory access to communication carriers who have customers within a building, and limit what the property owner may charge for such access. These laws require that a carrier be permitted to install their own in-building wiring; however, there is no requirement that property owners allow these carriers to use existing wiring.

In June 1999, the FCC announced that it was considering adopting rules on a number of issues related to riser access in multiple tenant environments and requested comments on the following issues, among others:

- the FCC's tentative conclusion that utilities must allow communications and cable service providers access to rooftops and other rights-of-way as well as riser conduit in multiple tenant environments on just, reasonable and nondiscriminatory rates, terms, and conditions;
- whether incumbent phone companies should make available unbundled access to riser cable and wiring within multiple tenant environments; and
- whether real estate owners offering access to any communications provider should be required to make comparable access available to these providers on a nondiscriminatory basis, and whether the FCC has the authority to impose such a requirement.

Arguing that their facilities (specifically phone closets and risers) should be considered as private property as opposed to public rights of way, building owners have opposed most of the Commission's moves. Although it is unclear how this issue will be resolved on the regulatory front, we think it is reasonable to assume that multiple, but not an unlimited number of, carriers will ultimately be able to obtain access to telecom-relevant facilities in commercial buildings. Furthermore, we believe that most such arrangements will be negotiated on a direct, private basis rather than be reached through litigation.

BSPs' Multi-Faceted Value Proposition to Building Tenants: As do other competitive broadband providers, BSPs generally attempt to offer customized bundles that combine numerous types of services—voice, data, long distance, Internet, hosting, and so forth. Because of their concentrated infrastructure deployment within the building, it can be argued that BSPs can deploy their capital and deliver these services more efficiently. In cases where the BSP relies on third-party providers for services such as hosting or Internet peering, BSPs, due to their generally high penetration rates within served buildings, can deliver concentrated demand to their suppliers, which potentially translates into attractive pricing and premium service levels.

An even more unique aspect of many BSP models is the on-site representative, who maintains a daily presence in a particular building or group of buildings and assumes multiple roles, including customer care representative, network engineer, communications consultant, IT administrator. By providing not just basic connectivity but ongoing customized service, BSPs can enhance customer retention and realize additional revenues.

Finally, on the e-commerce front, many BSPs attempt to provide value-added, proprietary content that is specific to individual locations. The idea here is to facilitate in-building or local business communities and share in the resulting transaction revenues. By aggregating multiple tenants into a single, building-centric portal, BSPs can offer dot-com firms, application service providers, local vendors, and other entities the opportunity to target a pre-selected group of prospects. The BSP e-commerce opportunity has given impetus to numerous efforts by third-party development firms to establish building-centric portals in major markets.

Sales and Marketing: BSP affiliations with the real estate companies enable them to take a different approach to providing telecommunication services to small and medium-sized tenants than traditional competitors normally take. This approach has the following unique features.

- **Preferred Marketing:** BSPs can utilize their relationships with real estate owners, building managers, and leasing representatives to market the services directly to the tenant in an on-network building.
- **Indirect Channels:** BSPs' real estate partners can feature the BSPs' broadband services in their own communications with tenants. In addition, "word of mouth" among tenants can be a powerful lead to generate interest in a BSP's services.
- **On-site Visibility:** BSPs can use lobby signage, direct mail, and in-building promotional events to create awareness of their services.
- **Efficient Marketing:** By utilizing teams whose territories consist of single buildings or small groups of buildings, BSPs can penetrate their addressable market efficiently.
- **On-site Presence:** The above-mentioned on-site representatives, who assume the role of a communications consultant and are responsible for developing and maintaining relationships with the tenants within the building, can help draw interest from tenants.

As a result of these building-centric marketing and sales efforts, BSP penetration rates among "mature" buildings (those in service for 12 months or longer) in the 30%-40% range are not uncommon–more than double the penetration rate of other competitors that are present in commercial office buildings. Although it is arguable that BSPs' economics are not as attractive as those of CLECs, since they usually lease access and transport from third parties and deploy relatively capital-intensive in-building networks, such metrics are a promising sign of the positive trade-off: superior in-building penetration.

Exhibit 8-6 depicts a break-even scenario for a commercial MTU-focused BSP. As noted, deployment costs can vary significantly among buildings and business strategies, as can the assumptions with respect to services offered and network costs.

Exhibit 8-6 ◆ Unit Economic Analysis for a Commercial MTU-Focused BSP

Assumptions:	
Customers per building	32
Voice penetration per customer	15.0%
Fixed costs	
DSLAM, Router, Other equipment cost (one-time)	25,000
Semi-fixed costs	
Installation cost/incremental capex (per tenant)	$5,000
Customer acquisition cost (one-time)	600
Customer premise equipment (one-time)	600
Gross semi-fixed costs (subscriber acquisition cost)	**$6,200**
Revenue from customer premise equipment (one-time)	(200)
Revenue from installation fee (one-time)	(150)
Net semi-fixed costs (subscriber acquisition costs)	**$5,850**
Variable costs	
Backhaul (monthly)	$1,500
Heating, lighting and power cost per colo (monthly)	$300
Rent (monthly)	250
Total variable costs	**$2,050**
Recurring monthly voice revenue per customer (weighted average)	$75
Recurring monthly data revenue per customer	$500
Recurring monthly revenue per customer	**$575**
Customer revenue margin	**$148**
Breakeven (tenants)	**4.9 ***
Breakeven (penetration)	**15.2% ***

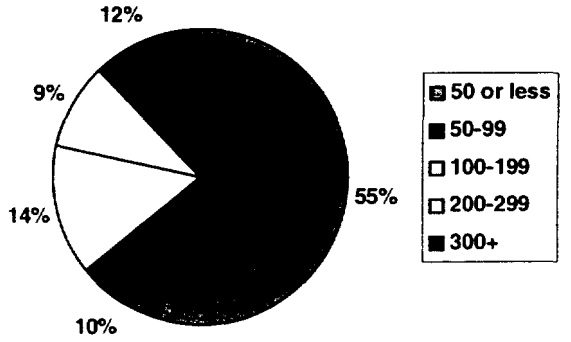
* fixed costs amortized over 36 months

Source: Dain Rauscher Wessels

◆ Multi-Tenant Dwelling (MDU)—Residential BSPS

Many of the same trends that support growth in residential DSL and cable modem services are supporting expansion in the residential BSP sector as well. According to the U.S. Census Bureau, 81.5 million residents, or 30.7% of the U.S. population, live in renter-occupied housing. Of this amount, approximately 9.4 million people live in apartment properties that contain 50 or more units, and 7.4 million live in properties with 100 or more units, indicating a significant concentration of potential Internet users. **Exhibit 8-7** illustrates the distribution of apartment properties based on the number of rental units in each property, based on data from the National Multi-Housing Council.

Exhibit 8-7 ◆ Rental Property Distribution by Number of Units



Source: National Multi-Housing Council

The network architecture of an MDU-focused BSP is roughly similar to that of providers that are focused on commercial multi-tenant units. Since apartment buildings tend to have more tenants than commercial buildings, it is often more economical for the BSP to install the necessary infrastructure to all apartment units. In this manner, new service activation can be centralized rather than have a technician visit the property each time service is requested. Some BSPs partner with private cable operators, utilities, or other non-telco providers to gain access to MDUs, while others use existing on-premise infrastructure from the incumbent. In general, relationships between MDU owners and BSPs lend themselves to a greater degree of exclusivity than those between MTU owners and BSPs. In **Exhibit 8-8**, we depict some of the major players in the MDU space and their real estate partnerships.

Exhibit 8-8 ◆ BSP-Real Estate Partnerships in the Multi-Dwelling Unit Space

BSP	Real Estate Partners/Strategic Alliances	Company Type
Broadband Residential	The JBG Companies	Multi-Residential Property Owner
	other undisclosed partnerships	
BROADBANDnow	Archstone Communities	Multi-Residential REIT
	AvalonBay Communities	Multi-Residential REIT
	Camden Property Trust	Multi-Residential REIT
	Forest City Residential	Multi-Residential Property Owner
	Home Properties of NY	Multi-Residential REIT
	Summit Properties	Multi-Residential REIT
CAIS Internet	Mid-America Apartment Communities	Multi-Residential REIT
	Town & Country Trust	Multi-Residential REIT
	Tarragon Realty	Multi-Residential REIT
	United Dominion Realty Trust	Multi-Residential REIT
Darwin Networks	Post Properties	Multi-Residential REIT
	Southern Management Company	Multi-Residential Operator
	Wolff Management Company	Multi-Residential Operator
OnePoint Communications	Apartment Investment& Management Co.	Multi-Residential REIT
	AvalonBay Communities	Multi-Residential REIT
	Apex Management	Multi-Residential Operator
	Charles E. Smith Residential	Multi-Residential REIT
	Equity Residential Properties Trust	Multi-Residential REIT
	Harbor Management	Multi-Residential Operator
	Kay Management	Multi-Residential Operator
	Keystone Properties	Multi-Residential Owner
	Lane Properties	Multi-Residential Owner
	Panco Management	Multi-Residential Operator
	R&B Management	Multi-Residential Operator
	RIMSI Management	Multi-Residential Operator
	Scott Management	Multi-Residential Operator
	Southern Management	Multi-Residential Operator
	Summit Properties	Multi-Residential REIT
	Town & Country Trust	Multi-Residential REIT
	United Dominion Realty Trust	Multi-Residential REIT
	Walden Residential	Multi-Residential REIT
Reflex Communications	Multiple Undisclosed Alliances	
Skyway Partners	Not Available	

Source: Company reports and Dain Rauscher Wessels

Like many cable overbuilders that are focused on the residential market (see Section 7 for a discussion of cable-based broadband strategies), MDU-focused BSPs often attempt to provide a service bundle that includes a combination of high-speed Internet access, video, telephony, customized Web content, community-centric portals, and other offerings. Most BSPs focus on the more demographically attractive class A and class B properties, whose residents represent a more desirable target market in terms of discretionary income, PC ownership, and other factors. However, since the composition of Internet usage and PC ownership within many MDUs mirrors that of the general population (about 50% of households have a PC), some MDU-centric BSPs are examining ways in which to broaden their addressable market by delivering Internet services to television as well as the PC.

Based on our conversations with service providers, services are typically priced in the range of $25-$80 per month, depending on the number of services offered. Revenue shares on the order of 10%-15% with the landlord are not uncommon. In **Exhibit 8-9** we provide a breakeven analysis for broadband service in multi-dwelling units.

Exhibit 8-9 ◆ Unit Economics for MDU-Focused BSP

Assumptions:	
Tenants per MDU	100
Fixed costs	
DSLAM, Router, Other equipment cost (one-time)	20,000
Total fixed costs (network capex)	**$20,000**
Monthly network capex *	**$556**
Semi-fixed costs	
Installation/provisioning costs	$800
Customer acquisition cost (one-time)	150
Customer premise equipment (one-time)	275
Gross semi-fixed costs (subscriber acquisition cost)	**$1,225**
Revenue from customer premise equipment (one-time)	(200)
Revenue from installation fee (one-time)	(100)
Net semi-fixed costs (subscriber acquisition costs)	**$925**
Variable costs	
Backhaul (monthly)	$800
Heating, lighting and power cost (monthly)	$150
Rent (monthly)	50
Total variable costs per sector (monthly)	**$1,000**
Total variable costs per customer (monthly)	**$67**
Recurring monthly revenue per customer	**$80**
Customer revenue margin	**$13**
Breakeven (customers)	**13.7 ***
Breakeven (penetration)	**13.7% ***

* fixed costs amortized over 36 months

Source: Dain Rauscher Wessels

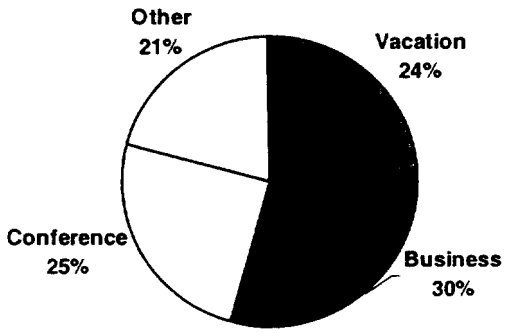
◆ Lodging

The vast majority of business travelers with laptop computers log onto the Internet or corporate networks at analog speeds when they are on the road. With the proliferation of broadband capacity in both the residential and business sectors, many businesses and employees are demanding faster access speeds while away from the office. The strong potential demand for high-speed access from business travelers, coupled with the burgeoning popularity of virtual private networks (and the ability to use Internet access as a means to gain access to one's corporate network), has created an attractive opportunity for broadband service providers to target the hospitality market.

Market Overview: According to the American Hotel & Motel Association (AH&MA), there are approximately 51,000 hotels in the United States with a total of 3.9 million rooms. The international hotel market totals approximately 250,000 properties with 8 million rooms. Based on AH&MA statistics, we estimate that approximately 55% of domestic lodging demand is from business travelers, who are the more likely users of broadband services. This is supported by an American Express report that estimates that 65% of business travelers carry laptop computers.

The AH&MA profiles the typical business traveler as a male (74%), aged 35-54 (53%), employed in a professional or managerial position (52%), and earning an average annual income of $68,000. The average amount paid per room is $83 per night, which is 12.2% higher than that paid by a leisure traveler. Considering that business travelers are more likely to be traveling on their company's expense, we believe the higher daily rate reflects a degree of price insensitivity; thereby indicating a more receptive audience to utilizing broadband access.

Exhibit 8-10 ◆ Lodging Demand



Source: AH&MA

Those BSPs that are currently addressing the domestic lodging market charge travelers approximately $10 per night for high-speed access. We conservatively estimate an average of 750,000 business travelers with laptop computers stay in hotels each night. Based on today's 5% average usage rate for high-speed services, we estimate annual revenues in the domestic lodging market of approximately $140 million. We believe the overall market could easily increase multi-fold, to $1 billion or more, with increased usage (see following discussion of usage trends) and additional revenue opportunities that are possible from providing high-speed access from meeting rooms and conference facilities.

Building Strategic Service Providers (BSPs)

The major players in the hospitality-focused broadband market are depicted in **Exhibit 8-11**. As with multi-tenant commercial buildings, this sector is in the land grab stage with most providers signing on major hotel owners and property managers as strategic partners. Although these agreements have varying degrees of exclusivity, we believe that in practice, multiple providers will rarely attempt to install infrastructure to the same set of hotel rooms.

Exhibit 8-11 ◆ Strategic Alliances Between BSPs and Real Estate Partner in the Hospitality Segment

BSP	Real Estate Partners/Strategic Alliances	Company Type
CAIS Internet	Hilton Hotels	Hotel Owner/Operator
	Carlson Worldwide Properties	Hotel Owner/Operator
	John Q. Hammons Hotels	Hotel Owner/Operator
	Haverford Hotels	Hotel Owner/Operator
	Staybridge Suites by Holiday Inn	Hotel Owner/Operator
	Prime Hospitality Corp.	Hotel Owner/Operator
	Bass Hotels & Resorts	Hotel Owner/Operator
Darwin Networks	Bass Hotels & Resorts	Hotel Owner/Operator
	Cavanaughs Hospitality Corp.	Hotel Owner/Operator
	Choice Hotels	Hotel Owner/Operator
	Focus Enterprises Hotels	Hotel Owner/Operator
	Pacifica Host Hotels	Hotel Owner/Operator
Mobilestar	Bass Hotels & Resorts	Hotel Owner/Operator
	Hilton Hotels	Hotel Owner/Operator
	MeriStar Hotels	Hotel Owner/Operator
	Starwood Hotels & Resorts Worldwide	Hotel Owner/Operator
STSN	Interstate Hotels	Hotel Operator
	Marriott International	Hotel Owner/Operator
	Sunstone Hotels	Hotel Owner/Operator
Wayport	JMH Hotels	Hotel Owner/Operator
	LodgeNet	Guest Room Entertainment and
	Marshall Management	Hotel Operator
	Shoney's Inn & Suites	Hotel Owner/Operator
	Stanford Hotels	Hotel Owner/Operator
	Wyndham International	Hotel Owner/Operator

Source: Company reports and Dain Rauscher Wessels

Usage Trends: Current usage rates for high-speed service is in the 3%-7% range; however, we believe this penetration level reflects only the "early adopters," as high-speed in-room access has only been available in small portion of hotels and has not achieved a high degree of public visibility. Further, Ethernet card-equipped laptops, which are generally required for high-speed access, are not yet standard fare for business travelers.

As marketing and network deployments increase, we expect usage rates to increase dramatically. Considering that today's analog modem usage penetration in hotel rooms is on the order of 60% and that the percentage of laptops equipped with high-speed compatible Ethernet cards is increasing rapidly, we believe overall penetration could increase many times over. In addition, we believe that the likelihood that a guest will abandon high-speed service and return to dial-up is remote.

Network Deployment: In the United States, deployment of broadband infrastructure in hotels is proceeding at a rapid pace—many BSPs have told us they are able to complete installation of the necessary equipment throughout a single property within a few days. As with MTUs and MDUs, hotel-focused broadband providers typically establish a local point of presence in each hotel, with the BSP usually footing the cost of deployment at no direct expense to the building owner. However, depending on the buildout plan, there could be a modest indirect cost to the building owner if the network deployment requires rooms to be taken temporarily out of service. The hotel POP contains the equipment that facilitates high-speed links to guest rooms, frequently using existing in-building wiring and employing a copper-enhancing technology such as DSL. In each equipped room, operators typically install Ethernet jacks, which business travelers can use to connect their laptop computers. As the use of wireless LAN technology becomes more common, many installations may forego the jack and utilize high-speed wireless alternatives. Installation costs per room average $200-$400, depending on the operator and the complexity of the build-out.

Depicted in **Exhibit 8-12** is a rough breakeven analysis for hotel-based broadband access. Although pricing is fairly standardized at $10/night (approximately double that amount overseas), revenue shares with the hotel operator range from 20%-50%, depending on the specific arrangement.

Exhibit 8-12 ◆ Breakeven Scenario for Hotel Broadband Access

Assumptions:	
Rooms	200
Occupancy	65.0%
Rate per night	$10.00
Revenue share	25.0%
Net revenue per night	$7.50
Expenses	
Equipment cost	$45,000
Capex (* annualized)	15,000
Network operations per year	18,000
Total annual expenses	**$33,000**
Revenues	
Annual guest room revenue (at break-even penetration)	$18,857
Annual meeting room revenues	14,143
Total annual revenues	**$33,000**
Breakeven (penetration)	**5.3%**

* capital expenditures amortized over 36 months

Source: Dain Rauscher Wessels

Additional Revenue Opportunities from Advertising and E-Commerce: Given the attractive economic demographic profile of business travelers (high education, high income), many BSPs are attempting to mine additional revenue opportunities by adding specialized content onto the room start-up screen. This has the potential to generate advertising and e-commerce revenues.

◆ Public Access— High-Speed Access for the Business Traveler

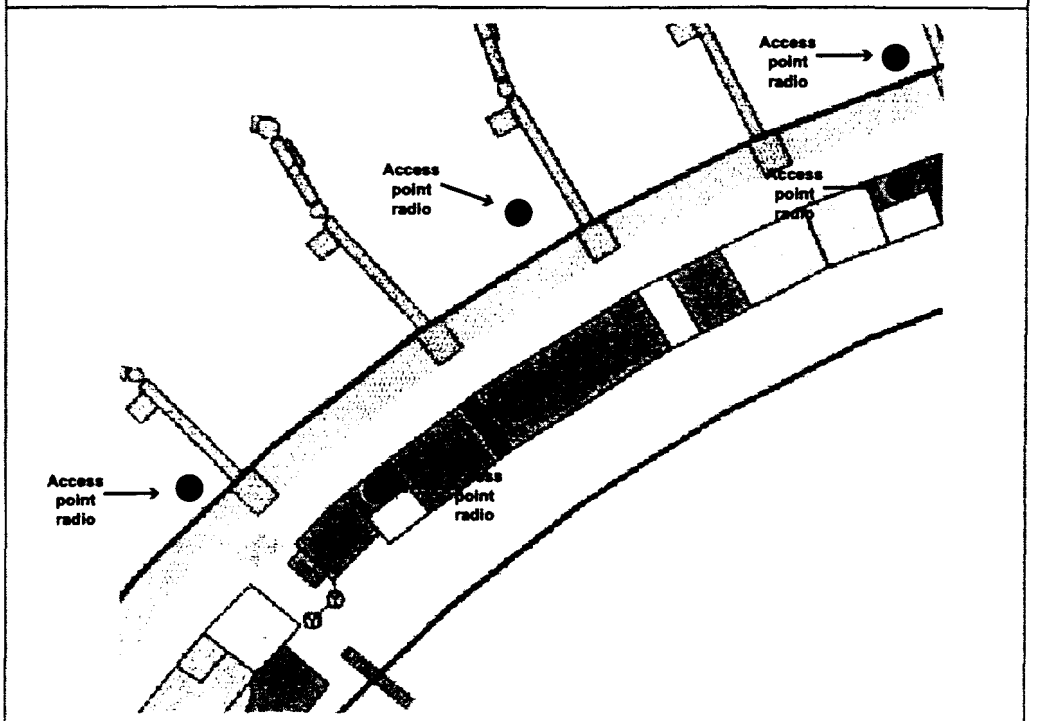
Demand for high-speed access to the Internet as well as corporate networks is contributing to the installation of broadband services in public venues that are frequented by business travelers, such as airport gate areas, frequent flyer lounges, conference facilities, and convention centers. With limited time on the go and a high degree of urgency, the nation's 12 million frequent business travelers represent a user base that is likely to place a premium on speed and be relatively insensitive to price.

For the frequent traveler, initial public access offerings have taken the form of an Internet-accessible public kiosk or a private office area containing high-speed connections that can be rented out for short periods of time. As the use of VPNs to gain access to corporate networks over the public Internet steadily increases, we believe that business travelers will derive greater value from public access and view it as a way accomplish meaningful amounts of work, as opposed to just obtain access to the Web.

In parallel with the trend toward VPNs, we believe that the adoption of high-speed wireless LAN technologies utilizing freely available, unlicensed frequencies (such as the 2.4 GHz and 5 GHz bands discussed in Section 6) will lead to far greater access to the Internet and corporate networks from public venues. Many laptop and modem manufacturers are now building equipment that is compatible with the newer wireless LAN standards such as 802.11b and BlueTooth. As wireless LAN cards coupled with this newer equipment penetrate the installed business user base, the addressable market for BSPs that are now deploying wireless LAN radios in airline terminals, frequent flyer lounges, and other high-business-traffic locations is expected to increase significantly. With wireless throughputs ranging from 700 kbps to 11 Mbps, business travelers will likely perceive no difference in access speed compared to their daily office environments.

Deployment: Exhibit 8-13 depicts a typical airport installation. The BSP deploys small wireless LAN radios at access points that cover frequently trafficked gate and lounge areas. Most current equipment designs operate in the unlicensed 2.4 GHz band, but it is possible that future deployments will utilize the unlicensed 5 GHz band. Each access point is connected to a central hub, which in turn is connected to the Internet.

Exhibit 8-13 ◆ Typical Airport Installation of Public Broadband Access System



Source: Dain Rauscher Wessels

Although current deployments are limited to a handful of airports today, a number of companies, such as Wayport, MobileStar, and SoftNet Zone, are aggressively building out their networks to include several dozen locations. The current focus tends to be airports, but future deployments could well extend to hotels, convention centers, and other public facilities.

Exhibit 8-14 depicts some of the major strategic relationships that have been formed in the public-access arena. As with the other BSP segments described in this chapter, the public-access sector is in the "land grab" phase as it relates to obtaining access for eventual network construction.

Exhibit 8-14 ◆ Strategic Relationships in the Broadband Public Access Sector

BSP	Strategic Alliances	Partner Type
CAIS Internet	Royal Caribbean International	Cruise Operator
MobileStar	American Airlines	Airline Carrier
	Multiple hotel properties for public-area installation	Lodging
	Multiple U.S. and international airports	Transportation Authority
SoftNet Zone	Delta Airlines	Airline Carrier
	Multiple U.S. and international airports	Transportation Authority
	CMGI	Technology Incubator
	Nokia	Wireless Devices Manufacturer
Wayport, Inc.	Multiple North American airports	Transportation Authorities
	Toshiba	Electronics Firm
	IBM	Computer Firm

Source: Company reports and Dain Rauscher Wessels

Installation costs for, say, an airport, depend greatly on the complexity of the build-out and the amount of public area to be covered. As a rough estimate, it costs $5,000-$10,000 to deploy an access point today, including equipment costs and backhaul arrangements to the central point of presence, although equipment costs are expected to decline rapidly. A small airport can be equipped with wireless LAN and backhaul infrastructure for less than $50,000, while a major hub airport can run into the $200,000-$300,000 range or higher.

Apart from meeting capital requirements and possessing the requisite network know-how, an equally important factor in building out public-access broadband installations relates to process. Considering the example of airports, an operator must be able to coordinate relationships and processes among multiple parties, including several government jurisdictions (municipal, county, and/or state), airlines, and airport authorities.

Content, Marketing, and Distribution: Given the nascent stage of this industry segment, it is too soon to attempt to accurately depict the myriad of marketing and distribution arrangements that are being discussed or tested. In general, airline partners, travel companies, established telecommunications firms, and property owners and operators appear to be the most likely parties to co-market broadband services aimed at the business traveler. As with other segments in the BSP space, operators and strategic partners may in many cases attempt to add content-related features to their core broadband access offerings in order to take advantage of the attractive end-user demographic profile and "location-aware" nature of the service to generate additional revenue streams. The nature of potential revenue-sharing arrangements between core operators and the strategic partners will likely depend on a number factors related to brand, potential bundling of other services, and even site build-out arrangements.

Even the end-user pricing model for public broadband access is not uniform. Depending on the operator, users may be charged by the month, by the day, by individual access session, by the amount of bandwidth transferred, or some combination thereof. Monthly subscription arrangements akin to the cellular phone model, in which the monthly fee includes a fixed amount of usage but does not cover over-use, are just one plausible scenario. Since no one firm should have a monopoly on public sites that are frequently trafficked by business travelers, it is highly conceivable that operators will form alliances with one another in order to allow users to roam among multiple networks (also akin to the cellular model).

Exhibit 8-15 ◆ Publicly Traded Building-Centric Broadband Providers

(Amounts in millions, except per share figures)

			Stock Price Information						Balance Sheet				Revenue					Operating Metrics	
			Price	52 Week Range		Shares	FD Shares	Market	Long Term	Preferred		Enterprise				Enterprise Value / Rev.		Sq. Ft.	
Company	Symbol	FYE	06/01/00	High	Low	Out	Out	Cap	Debt	Stock	Cash	Value	LTM	CY00E	CY01E	CY00E	CY01E	Infrastructure	Customers
Allied Riser Communications	ARCC	Dec	$13.25	$48.75	$9.03	53.32	56.87	$753	$13	$0	$272	$494	$2	$11	$81	46.6 x	6.1 x	100,000,000	567
CAIS Internet, Inc.	CAIS	Dec	14.88	48.63	9.88	16.94	22.99	342	18	90	56	393	10	NA	NA	NM	NM	N/A	N/A
Cypress Communications, Inc.	CYCO	Dec	6.88	29.94	6.00	22.84	108.30	745	0	0	224	521	7	18	84	29.3 x	6.2 x	55,000,000	417
FiberNet Telecom Group, Inc.	FTGX	Dec	11.25	25.50	3.69	25.93	27.77	312	1	70	2	380	0	NA	NA	NM	NM	N/A	N/A

Source: FactSet

Allied Riser Communications	www.alliedriser.com	Allied Riser provides of broadband data, video, Web hosting, and advanced conference calling services to businesses located in commercial office buildings throughout the country. The company's network and services extend beyond commercial buildings to include a number of additional connectivity services. ARC delivers its services over fiber optic networks that it designs, constructs, owns and operates inside large and medium-sized office buildings.	1700 Pacific Avenue Dallas, TX 75201	Crescendo Venture Management, Norwest Venture Partners, Goldman Sachs, numerous real estate owners and operators.	ARCC
CAIS Internet	www.cais.com	CAIS Internet provides high-speed Internet and portal services to business travelers in hotels, meeting rooms, convention centers, and other public areas; as well as to residents of multi-dwelling units. The company also provides dial-up and dedicated Internet access as well as hosting and collocation services.	1255 22nd Street, NW Washington, DC 20037	Kohlberg Kravis Roberts; ING Capital; numerous hospitality chains and real estate interests.	CAIS
Cypress Communications	www.cypresscomm.com	Cypress Communications provides small and medium-sized businesses in commercial office buildings with a full line of communications services, including high-speed Internet access, digital desktop equipment, local and long distance phone service, voice mail, and digital satellite television. The company constructs in-building networks consisting of fiber optics, coaxial cable, and copper connections to provide a wide array of offerings.	Fifteen Piedmont Center Atlanta, Ga 30305	The Centennial Funds, Alta Communications, Beacon Ventures, Nassau Capital, Gramercy Communications Partners, AEW Partners III, L.P., Transwestern Commercial Services, Latona Cycom Investment, LLC., numerous real estate owners and operators	CYCO
FiberNet Telecom Group	www.ftgx.com	Fibernet provides broadband transport services for both inter and intra-building connections, as well as associated collocation services. The company operates in-building fiber networks as well as metropolitan-area fiber connections between major commercial office buildings and carrier interconnection points, such as central offices and "carrier hotels," and provides its services on a wholesale basis. The company's current operational focus is New York City, with plans to expand to additional markets.	570 Lexington Avenue New York, NY 10022	Signal Equity Partners, Trident Telecom Partners, Metromedia Fiber Network	FTGX
SoftNet Systems	www.softnet.com	Through its ISP Channel subsidiary, SoftNet provides high-speed Internet access service with partnering cable operators. SoftNet's Intellicom subsidiary provides two-way satellite-based broadband services to schools, government institutions, and businesses. The company's SoftNet Zone unit provides Internet access to business travelers in airports and other public-access venues using wireless LAN technology and conventional wired T1 services.	650 Townsend Street San Francisco, CA 94103	RGC International Investors, White Rock Capital, Stark International, CMGI, Compaq, Delta Airlines	SOFN
B2B Connect	www.b2bconnect.com	B2B Connect delivers high-speed data communications, information technology and support services to the desktop within multi-tenant buildings. The company's offerings include a voice telephony, Internet access, data networking, Web hosting, and managed services.	2350 Mission College Blvd. Santa Clara, CA 95054		private

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Broadband Residential	www.bbrez.com	Broadband Residential provides broadband services to tenants of multi-dwelling units, including a bundle of high-speed Internet, data networking, video, and e-commerce offerings. The company partners with property owners for building access and to establish a local presence for marketing and customer support. The company employs a variety of broadband technologies and backbone partners for high-speed connectivity to its in-building networks.	6708 Wisconsin Avenue Bethesda, MD 20815	Federal Capital Partners, JBG Companies, eLink Communications, and other private sponsors and network partners.	private
BroadbandNOW	www.bbnow.com	BroadbandNOW is a BSP that provides high-speed Internet access and multimedia content and applications to residential subscribers in multiple dwelling units and single-family homes in numerous regions of the country. The company's broadband network utilizes a variety of transmission technologies, including a private, national fiber backbone as well as cable modem, DSL, and wireless technologies.	1440 Corporate Drive Irving, TX	Lucent, Nortel, Liberty Media, GE Capital, Geneva Associates, Marcus & Partners, real estate partners	private
Darwin Networks	www.darwin.net	Darwin Networks provides broadband and Internet services to several vertical segments, including multi-tenant commercial buildings, multi-dwelling units, hospitality, and public access. The company provides access using multiple broadband technologies, including DSL, T1, and wireless services. The company has deployed its network in multiple regions of the country and is in progress to launch services in approximately 800 locations in almost 40 states.	National City Tower 101 S. Fifth Street Louisville, KY 40202	Chrysalis Ventures, Vulcan Ventures, Richland Ventures, River Cities Capital, AT&T	private
Edge Connections	www.edgeconnections.com	Founded in 1999, Edge Connections is deploying in-building DSL infrastructure aimed at providing bundled voice, high-speed data, hosting, and other advanced services to small and medium-sized businesses in multi-tenant commercial buildings. The company is initially launching its network in eight major markets using a network architecture that leverages relationships with numerous IXCs, LECs, and ISPs for long-haul, local, and Internet connectivity.	1200 Abernathy Rd. Atlanta, GA 30328	Great Hill Partners Megunticook Fund	private
eLink Communications	www.elinkcommunications.com	eLink Communications partners with commercial building owners and property managers to wire their buildings with fiber-optic infrastructure in order to offer broadband Internet, data networking, and telecommunications services to business tenants. The company also provides on-site, in-person customer service through its CyberSuper Service program. eLink is preparing to roll out a tenant-centric portal, voice over IP services, and an applications hosting service for small and medium-sized businesses.	6708 Wisconsin Avenue Bethesda, MD 20815	Encore Venture Partners, Mayfield Fund, Avalon Investments, Communications Equity Associates, Lazard Technology Partners, The Greenwich Group	private
Eureka Broadband	www.eurekabroadband.com	Eureka Broadband provides broadband services to business customers in commercial office buildings. The company's in-building network is deployed in over 300 buildings, primarily in New York and Southern California. Eureka bundles broadband applications and content, such as Internet access, software rental, video streaming, business TV and other IT services over its packet-based fiber network.	270 Madison Avenue New York, NY 10016	AT&T Ventures, Spectrum Equity Investors, Eagle Financial Partners, Lineactive	private

Broadband Service Company	Website	Description	Address	Financial Sponsors	Status
OnePoint Communications	www.onepointcom.com	OnePoint Communications provides communications services for residents of apartment communities. The company offers local and long-distance telephone service, cable television and high-speed Internet access, and serves more than 68,500 customers in 10 states.	150 Field Drive Lake Forest, IL 60045	SBC Communications, Ventures in Communications, and other private sponsors	private
OnSite Access	www.onsiteaccess.com	OnSite Access is a building-centric provider of integrated voice, data, and Internet services. The company has deployed broadband facilities covering over 350 million square feet of real estate in 29 markets.	1372 Broadway New York, NY 10018	Spectrum Equity Investors, Crosspoint Venture Partners, JP Morgan Capital, AT&T Ventures, Reckson Service Industries, Veritech Ventures, numerous real estate owners and operators.	private
Phatpipe	www.phatpipe.com	PhatPipe is a tenant-centric business services provider that enables commercial real estate owners the ability to offer products and services to their tenant base, while leveraging bulk tenant demand to negotiate discounts on services such as broadband access.	1902 Wright Place Carlsbad, CA 92008	AMB Properties	private
ReFlex Communications	www.reflexcomm.com	ReFlex Communications provides high-speed Internet, data, video, and voice services to apartment and condominium communities. The company's network spans 12 markets across nine states.	83 S. King St., Ste. 106 Seattle, WA 98104	The Sprout Group Enterprise Partners	private
Skyway Partners	www.skywaypartners.com	Skyway Partners provides broadband services to tenants of multi-tenant commercial and residential buildings. The company's offerings include data, voice, video, and Internet services over in-building broadband facilities.	200 Motor Parkway Hauppauge, NY 11788	numerous private sponsors	private
STSN	www.stsn.com	STSN provides high-speed Internet, VPN, and e-commerce services to the business traveler market. The company is partnering with business hotel chains to deploy wireless LAN and wireline broadband infrastructure in major U.S. and international cities.	5983 S. Redwood Drive Salt Lake City, UT 84123	APV Technology Partners, BankONe, First Media ST Holdings, Intel Corporation, Marriott International, Third Coast Capital, ThomVest, TransAmerica Technology	private
Tenant Connect	www.tenantconnect.com	Founded in 1994, TenantConnect is a BSP that provides voice and data telecommunication services to small to medium-sized businesses in more than 2,000,000 square feet of office space. The company is a registered CLEC in its operational markets, located primarily in Southern California.	2716 Ocean Park Blvd, Suite 1064 Santa Monica, CA 90405	Real estate owners and operators.	private
Urban Media	www.urbanmedia.com	Urban Media is a building-centric service provider offering free basic Internet connectivity to small and medium-sized businesses as well as an array of fee-based broadband services, such as local and long distance voice, e-mail services, domain name registration, remote access, Web hosting, and virtual private networking. Urban Media's services also include an integrated e-toolbar, which provides customers access to specialized services, content and applications.	101 University Avenue Palo Alto, CA 94301	SOFTBANK Venture Capital, Accel Partners	private
Wayport	www.wayport.com	Wayport uses wireless LAN technology to provide high-speed Internet access and VPN services to business hotels, airports, and meeting facilities.	8303 North MoPac Expressway Austin, TX 78759	Sevin Rosen Funds, New Enterprise Associates, Trellis Venture Partners, and GC Technology Fund	private

Section 9:
Smart-Build Carriers and Broadband Intermediaries