

Regulation and Vertical Integration in Broadband Access Supply

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Dynamic changes in telecommunications systems, networks, and markets are driving both cable television operators and local telephone exchange to vertically integrate into the supply of broadband access. Policy makers are considering regulatory limits on product bundling as a prophylactic against foreclosure in cable. Rules in place for legacy phone networks already impose common carrier obligations, and some now advocate stronger measures against vertical integration including structural separation of a core network from retail services including broadband access. Evidence suggests, however, that vertical integration is efficient and encourages both investors and consumers to make specific (non-salvageable) commitments to deploy emerging broadband technologies. This evidence includes data gleaned from operating markets, financial markets, and the market for public policy.

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And enough already with this water-torture Tauzin-Dingell bill, and the bleating about “high-speed Internet access.” I am so sick of these insufferably relentless radio and TV ads. Vote for Tauzin-Dingell! Say no to Tauzin-Dingell! I have reached the point where I hate Tauzin, I hate Dingell – I even hate Bill. I don’t give a rat’s patootie about high-speed Internet access. At my age, the only high-speed access I want is to the restroom, thank you.

Tony Kornheiser, WASHINGTON POST (July 25, 2001)²

The intense policy debate over broadband regulation has spilled out into the public square, and many are puzzled by its contentiousness.³ According to proponents of cable “open access,” local cable operators dominate the market for high-speed Internet access in residential markets and must be forced to share their high-speed cable conduits with independent Internet Service Providers (ISPs) on regulated terms and conditions. The desired outcome is to have multiple firms competing to offer customers service, even as the rivals supply broadband access over the same physical platform. Proponents include broadband access suppliers who hope to gain low-cost access to retail customers via such rules, and local telephone companies (both incumbents and new competitors) offering Internet access service competing directly with cable modems.

Similarly, proponents of extensive unbundling mandates for incumbent local exchange carriers argue that legacy telephone monopolies will stifle broadband competition unless regulations guarantee the sharing of systems delivering digital subscriber line (DSL) service to residential users. Indeed, some have recently ratcheted the argument up: common carrier rules alone are insufficient to guarantee equal access to the facilities of incumbent local exchange carriers (ILECs), and a complete structural separation of wholesale and retail ILEC operations is called for. (Cowles and Winogradoff 2001; Dreazen 2001) This claim is made again by ISPs who would link to subscribers by reselling Internet access over an existing network, and by competitive local exchange carriers (CLECs) and cable television system operators offering rival high-speed modem access.

As for the economics of broadband access, early trends are visible. First, competing networks are vying for residential broadband market share.⁴ The primary rivals are cable TV systems upgraded to provide high-speed Internet access, and telephone lines sufficiently close to central offices of the local exchange carrier to provide digital subscriber line (DSL) service. Also offering broadband services are competing (“overbuilt”) cable systems, fiber optic local area networks, fixed or mobile wireless service providers, and satellite access technologies.

² “Tauzin-Dingell” refers to H.R. 1542, a bill to partially deregulate the data networks of Bell telephone companies.

³ “I think this is the most intense lobbying battle I’ve seen in my career; there are jokes on television about the commercials,” said Representative Chris Cannon, a Utah Republican on the Judiciary Committee who opposes [Tauzin-Dingell].” Alvarez 2001.

⁴ This paper focuses on residential broadband markets.

Second, the deployment of residential broadband access is still relatively modest. Of 105 million U.S. households, only about nine million subscribed to broadband service as of June 30, 2001 (See Table 1). Broadband penetration lags far behind narrowband dial-up access to the Internet, which accounted for about 52 million subscribers in mid-2001 (Alvarez 2001). Third, the broadband growth rate is high. Even with macroeconomic and sectoral conditions leading to a pronounced decline in telecommunications growth in first-half 2001, residential broadband subscribership rose 34% (Precursor 2001) from the previous six-month period.⁵

TABLE 1. U.S. RESIDENTIAL BROADBAND SUBSCRIBERSHIP (JUNE 30, 2001)

<i>Platform</i>	<i>Subscribers (thousands)</i>	<i>Share</i>	<i>Cost to Customer</i>		<i>Approx. Maximum Speed (kbps)</i>	
			<i>Initial</i>	<i>Monthly</i>	<i>Downstream</i>	<i>Upstream</i>
Cable Modem	6,095	69.8%	\$100	\$46	2000	128-500
DSL	2,467	28.2%	\$100	\$50	768	90-256
Overbuilders (cable modem)	95	1.1%	\$100	\$40	512	128-256
Satellite: 2-way	46	0.5%	\$700	\$70	150-500	40-128
Satellite: 1-way	42	0.5%	\$350	\$50	400	28-56
Wireless (AT&T via PCS, WCS)	32	0.4%	\$0	\$40	512-1500	150
Wireless (Sprint/MCI via MMDS)	2	0.0%	\$100	\$40	1000	512

Source: Precursor 2001.

While the broadband marketplace is just emerging, the regulatory debate is already roaring. For both cable modem service and the supply of digital subscriber lines, rules mandating third-party access to the infrastructure built by an incumbent service provider are at issue. In cable, such access rules would allow Internet Service Providers to use high-speed conduits owned by the cable operator, in effect prohibiting exclusive contracts with any ISP (particularly one owned by the cable system) as have been standard practice. In DSL, current regulations imposed by the FCC and state regulatory commissions mandate that incumbent phone companies share elements of their networks – for instance, local loops connecting homes and small businesses to central offices – with other carriers, including rivals, at cost-based wholesale rates.⁶ The contentious

⁵ The 34 percent sequential growth rate equals an annualized rate of 80 percent. The growth rate in the second half of 2000 was 71 percent sequentially, 192 percent annualized. Precursor 2001.

⁶ Retail DSL rates are also subject to regulation by state or federal authorities.

policy issue is whether new investments extending or upgrading data networks⁷ should be subject to similar sharing obligations.

The regulatory regimes applied to cable television and local exchange service providers differ, but the analysis of broadband access regulation is generally comparable. In their prototypical application, access mandates separate (or “unbundle”) the transport function (supplied by the network owner) from the retail service (supplied by competitors, intermediate service suppliers such as ISPs, or content owners). The question is often framed in terms of vertical integration, as communications services can either be provided by full-service networks or by layered contributions of independent suppliers. The essence of access regulation is to delink the layers, allowing multiple service providers to participate in the chain of production on terms subject to government control.

As outlined in the analysis to follow, mandated unbundling is likely to reduce broadband investment incentives without providing substantial stimulus to competition. This conclusion holds for both cable modem and DSL service. Moreover, rules limiting vertical integration are daunting to design, particularly given the rapid pace of deployment, the unsettled technology of emerging networks, uncertainty concerning consumer demands, and extreme volatility of market structures. The same factors, however, make returns to rent seeking in broadband policy relatively high. Erratic oscillations in product and capital markets can both confuse regulators and mask the results of their work. This raises the returns to strategic investments in the procurement of rules that inhibit demand for rivals’ services, and the high-growth phase of the broadband market makes this corporate behavior relatively profitable. A relatively high level of offensive and defensive lobbying is the result.

I. Vertical Integration and Efficiency

In offering goods or services to customers, a firm elects to provide some inputs directly and to rely on outsiders for the supply of others. Where this line is drawn was the fascinating query posed by Ronald Coase in his classic article (1937), and has been the subject of numerous economic investigations since (e.g., Williamson 1979). The consensus view in the economics literature is that vertical integration is pervasive and generally benign. Yet, depending upon the circumstances of the particular market (including regulatory constraints), vertical integration may prove either efficient or anti-competitive.

⁷ Morgan Stanley estimates suggest that 49% of U.S. households had DSL service offered to them at year-end 2001. The corresponding level for cable modem service was 77%. Morgan Stanley 2001, 10. To enlarge the potential DSL universe, the standard problem to overcome is the attenuation of data transmission over existing local loops; it is difficult to deliver inexpensive broadband access to DSL users more than about three miles from a central office. The most straightforward fix for this distance limit is to run fiber optic links to new nodes – outside the areas currently within the radius of easy data transmission – connecting additional homes to the high-speed network. The construction of such fiber links entails significant sunk costs.

Standard efficiencies identified in the literature include

- quality assurance, tightening coordination through the chain of production
- improving information flows between input suppliers
- eliminating upstream or downstream monopoly, ending double marginalization⁸
- lowering the cost of capital by guaranteeing fidelity to sunk investments⁹
- exploiting network externalities

Standard anti-competitive motives for vertical integration include

- raising entry barriers by increasing scale
- raising entry barriers by monopolizing a complementary asset
- transferring profits to evade rate-of-return regulation
- foreclosing competition from complementary products that could also become substitutes.¹⁰

Assume that a service is provided via two stages of production: wholesaling and retailing. Will consumers generally be better off where these functions are jointly by a supplier, or will net benefits accrue to separating these inputs? Even where pronounced scale economies suggest monopoly to be the lowest-cost market structure, these functions can in theory be separated.¹¹

Businesses make profit-maximizing choices in this matter on two general levels. First, the firm selects an optimal scale.¹² Second, the firm selects a method by which to achieve that size. That is to say that any given level of scale can be created by multiple business structures, including internal production of a complete package or by provision of components that consumers combine with complementary goods supplied by independent firms. The latter structure may be coordinated tightly, through standards, licensing, franchise agreements, or partnerships, or informally through the market. The limitations of contracting devices to yield pay-outs that properly reward the risks undertaken is a key consideration in selecting among the infinite number of options.

⁸ This occurs where two firms with market power are involved in a vertical chain of production. Either firm restricts output to drive up price; each firm loses profitability from the other's output restriction. The result is that vertical integration of two such firms tends to increase output. Put somewhat differently, there is only one monopoly profit to extract from a given product, and attempts by multiple firms in the chain of production to separately capture it raises product price above the monopoly level.

⁹ See Shelanski & Sidak 2001.

¹⁰ Krattenmaker & Salop 1986; Bresnahan 1999; Fisher 2001.

¹¹ A further complication is that "separation" is not a (0, 1) variable. Separate firms performing complementary functions may be brought together by a spot market, short-term contracts, long-term contracts, or long-term contracts with complex enforcement provisions (e.g., reciprocal dealing clauses). In the discussion below I differentiate between just two sorts of inter-firm relationships, arms length dealing (analogous to spot market transactions) and long-term contracting.

¹² This is a multi-dimensional choice variable, including product volume, geographic service area, and range of products (scope).

If markets were perfect, the future certain, and legal inputs abundant, contracts would be complete; firms could write all contingencies into an agreement and obtain the benefits of integration without having to combine asset ownership. While theoretically available in a zero transaction-cost world, actual markets do not offer such solutions. Imperfect contracts may mimic, but do not perfectly duplicate, the distribution of rights and responsibilities embedded in equity owners. Businesses trade-off the costs and benefits of contracts vs. those of ownership.¹³ This is the “transaction-cost” explanation for vertical integration.

Where fixed costs are substantial and non-salvageable, the long-run pay-outs are relatively uncertain, and the probability that the economic incentives of various “partners” will change over time (for instance, as they learn what consumers will pay for a service produced by a long-lived investment) high, firms tend to favor integration. Common equity interests are useful in binding investors where contracts among parties with disparate and changing interests often are not. Of course, as the cost of devising and enforcing contracts rises, this incentive to vertically integrate rises *pari passu*.

In simple terms, investors in risky projects attempt to lower the possibility that their partners will free ride, appropriating gains when returns are positive but abandoning projects (and liabilities) when returns are negative. “A contract that requires a party to make significant contract-specific investments... renders that party vulnerable to appropriation of some or all of its investment by the other party if the costs or benefits of performing the contract unexpectedly change after the contract is signed.” (Ordover & Willig, 1999, par. 57)

The effect of “open access” rules allowing independent firms to access cable or telephone networks at regulated wholesale rates is to curtail the opportunity for certain forms of vertical integration. Links between complementary input suppliers that could be provided by common ownership or contract are replaced by a price schedule setting forth terms and conditions of access pursuant to a regulatory proceeding (typically to deduce “efficient” or “reasonable” costs as the basis for access charges).

The result is that contracts are restricted from solving certain coordination problems important to investors. A simple example will illustrate. Suppose that AAA is considering the investment of \$X, a substantial sum, to construct a resort lodge on a remote Alaskan lake. Suppose further that the lodge would offer two consumer attractions: fishing and bird-watching. The latter would require no complementary services provided by the lodge (lodgers just sit and stare, or hike the rugged terrain on their own), but the former requires complementary inputs including guide services.¹⁴

¹³ Purchasing inputs in spot markets, forward markets, or other organized exchanges is taken as a contractual arrangement in this discussion.

¹⁴ I assume that guide services must be provided to attract fishing or kayaking enthusiasts to the lodge, perhaps telegraphing my lack of confidence in the wild.

AAA is uncertain as to how many visitors the lodge will attract or what proportion of lodge clients will demand fishing, but the expectation is that most customers will come for the fishing and demonstrate a high willingness to pay for boat rentals and guide services (ancillary services offered by the lodge for those guests who fish). On this expectation AAA believes that the project has a positive net present value.

In an unregulated environment, the standard market outcome is that AAA invests X *after* reasonably securing long-term fishing guide services. If the market for guide services is highly competitive, reliance upon the spot market may be sufficient. Here it is likely, however, that qualified guides in this remote location are relatively scarce. If so, some mechanism to assure that such services will be available at competitive rates will be sought by AAA prior to sinking capital. This mechanism is likely to be either a long-term contract or a share of equity in the venture. In effect, the lodge vertically integrates.

The problem created by an alternative arrangement is apparent. Suppose AAA builds the lodge and, once the assets are in place, then attempts to purchase fishing guide services for clients. Those few local guides available possess specific capital, and may exert market power in bargaining with the lodge owner. To the extent customers demand such inputs, guides can appropriate quasi-rents (payback of fixed costs).

Even where AAA lacks market power, it seeks to guard against appropriation. Common protective devices bind suppliers of complementary services to particular long-lived projects. Where regulators attempt to jump-start competition by requiring the sharing of such common facilities with independent service providers, an asymmetry of risks and rewards appears.

In this example, regulated access might grant fishing guides the option to purchase lodge rooms, docking privileges and fishing boats at cost, reselling such services – with their guide services – at retail prices to customers. If fishing proves very popular, the local guides will be able to make a killing – with the lodge owner collecting a competitive return as a wholesale supplier of infrastructure. If the fishing is poor, however, and few fishing customers are attracted, the independent fishing guides remain employed in their best opportunity – away from the lodge.

Meanwhile, the lodge owner experiences less demand than anticipated, and the investment project now realizes a negative capital value. Windfall losses, however, are not shared. The investor's consideration of this probabilistic pay-out stream – where favorable returns can be captured by rival service suppliers using the investor's network at cost-based rates, while the investor is left to absorb losses alone – clearly alters investment choices.

As a result of mandatory unbundling, those who commit capital to risky projects cannot protect themselves against free riding; in addition to the transaction cost limiting

contract design, rules now prevent burden sharing.¹⁵ Ordover & Willig (1999, par. 59) note that the “effectiveness of... contingency clauses... is limited by the powers of human foresight... Economists have shown that requiring market participants to obtain critical inputs through contracts rather than merger is likely to result in underinvestment and insufficient new entry.” This insight can be extended: “contingency clauses are limited by human foresight” *and prohibited by unbundling regulation*.

Indeed, the purpose of mandated access is to make the network available to those who did not contribute to its creation and made no pre-commitment to its profitability. Such users are granted the zero-cost option to use fixed, sunk resources should they elect to do so. Transferring the value of such options from the investor to the user reduces *ex post* returns, driving up the *ex ante* cost of capital. (See, generally: Dixit & Pindyck 1994.) The offer of unbundled “elements” vests potential service providers with the opportunity to compete without building facilities, an offer underwritten by the investor in the physical network. Both the incidence of the benefit and the burden of the payment tend to lower incentives to sink capital in fixed infrastructure (Hausman 1998).

Additional sources of free-riding exacerbate this cost increase. By giving regulators discretion to determine the price at which users may purchase network inputs, firms investing in fixed assets face potential opportunism from policy makers. The latter seek to maximize political support, income potential in post-agency employment, ideological goals, or some other function distinct from the profit maximand of the project investor. Because regulators cannot be bound by contracts in the same manner as private parties, and because future policy makers are free to revise determinations of the public interest, access rates may be lower than anticipated.

Alfred Kahn (1998, 2001) has specifically identified the regulated wholesale prices set by federal and state regulators to access local telephone networks as subsidizing entrants for political purposes. Indeed, TELRIC and UNE-P rates¹⁶ (guiding wholesale access prices paid by CLECs reselling ILEC transport service) have been explicitly set below the actual costs of incumbent firms (and for terms that are less than the life of the asset -- free options). The expectation that such terms will be set by regulation creates a risk premium for new investment. This provides an additional investment disincentive, one likely to be highest in a market exhibiting high (and volatile) growth rates, uncertain product demand, and unsettled technology. See Table 2.

¹⁵ See Klein, Crawford and Alchian 1978 for a detailed explanation of how the basic strategy in preventing opportunism is to avoid arms length, “unbundled” transactions, creating partners tied to each other for long-run dealings. When such agreements are voided in, for instance, antitrust decrees, vertical integration often results.

¹⁶ Total Element Long Run Incremental Cost, or TELRIC, defines what the Federal Communications Commission believes a hypothetical, state-of-the-art, efficiently sized network would cost to operate over a given output. Unbundled Network Elements – Platform, or UNE-P, is the sum of the network pieces, reassembled into a whole system, but costing only about one-half what a similar increment for the incumbent system costs. See Kahn 1998, 89-99.

TABLE 2. UNBUNDLING MANDATES AND DYNAMIC EFFICIENCY			
<i>Assumed Transaction Costs</i>	<i>Type of Market</i>	<i>Level of Vertical Integration</i>	<i>Efficiency Implication</i>
zero	Unregulated	indeterminate	Integration is irrelevant; free and complete contracts produce optimal resource use.
positive	Unregulated	Depends on costs of “using the market”	Integration remedies opportunism, limiting the costs associated with incomplete contracts.
positive	regulated by fixed mandatory access rules	limited by law	Investors barred from constructing remunerative pay-outs for partners, reducing risk-taking to below the optimal level.
positive	regulated by mandatory access rules set by potentially opportunistic regulators	limited by law	Incomplete contracts imposed and investors pay premium to insure against regulatory appropriation, further reducing risk-taking.

Mandatory access rules have spillover effects. To the extent that fixed capital is available to appropriate, the access regime signals rivals that the marginal trade-off between owning and renting has shifted in favor of renting. This effect is widespread, deterring investment in rival facilities (i.e., competitive fixed assets) for three reasons. First, firms not owning facilities are awarded zero-priced options to use the facilities of others. This makes risky investments to create such market opportunities relatively less desirable. Second, rules making transmission infrastructure available at regulated wholesale prices cap future returns from fixed investments. Should supply of the service in question prove more profitable than currently anticipated, the ability of new entrants to utilize network capital at (or below) cost will limit the upside returns enjoyed by owners of any facility providing such service.¹⁷ Third, competitive entrants face a non-trivial probability that they will be subject to similar network sharing mandates, particularly if they succeed in constructing advanced systems that win large market shares. Under current U.S. law competitive telecommunications facilities are not, in fact, exempt from unbundling requirements (although such rules are less onerous than for incumbent local exchange carriers). And entrants investing in competitive local exchange facilities inform their shareholders that free riding by current or future rivals is a tax on investment:

¹⁷ There is another factor that may offset these incentives of facilities-based entrants, namely the ability to rent facilities of incumbents during build-out, thus achieving market coverage (and some scale and scope efficiencies) while in transition to facilities-based competition. Of course, the premise of unbundling mandates is that the incumbent’s facilities will not be soon duplicated by rival networks.

These requirements also place burdens on new entrants that may benefit their competitors. In particular, the resale requirement means that a company can seek to resell services using the facilities of a new entrant, such as Cox, without making a similar investment in facilities. (Cox Cable 2000, 27-28)

A large source of irony in the approach taken to “unbundled” communication networks is that it departs sharply from previous policies to encourage dynamic efficiency found both in the economics literature and in public policy. The Demsetz solution to natural monopoly, for instance, described a competition for the monopoly that could be deployed in public franchising or in marketplace settings. (Demsetz 1968; Baumol, Panzar & Willig 1982) The essence of the approach is that, where monopoly provision is efficient, consumer gains can be extracted by the use of long-term contracts. Competition for these contracts can be arranged in franchising rounds (with formal requests-for-proposals), or via rivalry amongst firms to gain critical mass by offering consumers favorable terms. (Hazlett 1984) The dynamic powering an efficient solution was the lure of a long-term monopoly market share (for the supplier) in exchange for competitive performance on price, quality, and innovation.

The unbundling solution retains the monopoly service provision for that part of the production function deemed non-competitive by regulators, making illegal long-term contracts allowing firms and consumers to discover competitive solutions in the market. Hence, the monopoly position is supported by regulation, and the forces used to mitigate its anti-consumer effects are blocked. They are replaced by a wholesale price schedule devised by regulators that may, or may not, stimulate retail competition, which will tax investment in specific capital, and which will render market forces devising long-term solutions exploiting scale economies without output-restriction moot.

Contrast, too, the network-sharing approach with the defense of franchise barriers put forward by Victor Goldberg (1976). Goldberg noted that many of restrictions routinely found inefficient by economists – entry barriers, for instance – could be explained as devices to encourage investment in risk capital. (Goldberg 1976) This idea was quickly seized as an explanation of many market forms that had previously been attacked by antitrust enforcement authorities as anti-consumer. As Benjamin Klein and others showed, these restrictions on entry created via exclusive contracts, brand name capital, and other mechanisms, actually gave firms improved incentives to create specific capital. (Klein, Crawford & Alchian 1978; Klein & Leffler 1981)

The economic logic tracks those driving the institution of patents and copyrights. Restrictions on free entry can have powerful dynamic consequences, motivating a degree of long-lived investment that fully compensates for the static losses that predictably accrue from restricting output in the short-run. The nature of broadband markets today – high (and volatile) growth rates, technological flux, uncertain consumer acceptance – suggests that the benefits of pro-investment policies are relatively important compared to the yields available from promoting steady-state efficiencies via an increase in the number of competitors using the same facilities. Both economics and law have developed theories driven by the dynamic properties of long-term contracts, vertical integration, and restrictions on entry to protect innovators. Mandatory network sharing initiatives conflict frontally with this approach.

II. The Broadband Race: Rolling out Cable Modem Service and DSL

The crucial role of vertical integration in dispersing broadband technologies is emerging. One key indicator is provided by the distinct regulatory regimes faced by the rival services. Cable modem service is being offered by local cable monopolies, firms not facing effective regulation of rates (for video, or POCS – “plain old cable service”) nor subject to “open access” mandates. While the latter have been considered by several municipalities (in authorizing franchise transfers, pursuant to mergers of system operators, or renewals) and are the subject of continuing consideration by the Federal Communications Commission, cable systems currently operate without virtually any such regulatory obligations.¹⁸

The degree to which cable systems face weaker regulatory constraints than incumbent local exchange carriers is evidenced in the financial data. By comparing the market value of a financial asset (such as a telecommunications system) to the replacement cost of the tangible capital creating that asset, one gains a measure as to how much profitability investors associate with a given market position. This constitutes a so-called q ratio analysis, used frequently in finance and regulation.¹⁹ As seen in Table 3, cable systems sell for about four times the replacement cost of capital.²⁰ In contrast, Bell system local exchange carriers are valued at just over the cost of tangible assets. These market data reveal how much more lucrative anticipated revenue streams are in cable than in telephony. Telephone systems, largely governed by common carrier rules, are anticipated to receive approximately competitive returns. Cable television systems are not subject to such constraints, and are anticipated by investors to produce revenues far in excess of costs.

In this light, it is informative that cable modem service continues to outpace DSL in the broadband race. Despite early warnings that DSL service would prove superior to its cable modem competition (including a 1999 prediction by Cisco CEO John Chambers that DSL would soon dominate the high-speed access market), cable modem subscribership remains more than double that for DSL through mid-2001 (See Table 1). While competing explanations are possible, financial analysts have noted the reluctance of ILECs to sink resources in advanced networks. Cable television companies have themselves noted their greater degree of aggressiveness in rolling out new high-speed services. (AT&T 1999) This is a predictable implication of the distinct regulatory regimes governing each.

¹⁸ Pursuant to the merger of Time Warner and AOL, some ISP access requirements were levied on Time Warner’s cable systems offering AOL’s high-speed service. These obligations are not substantial. See Morgan Stanley 2001; Bittlingmayer & Hazlett 2001; Esbin 1999; Espin 2000.

¹⁹ The q-ratio equals the market value of assets divided by the replacement cost of tangible assets. It is a market measure of the degree of profitability associated with a given enterprise or industry. In a highly competitive market, assets will sell for about their replacement cost, implying a q-ratio near one. Where monopoly returns are anticipated by investors, q-ratios should be considerably higher. The q-ratio analysis is used to gauge market power in telecommunications markets; for instance, by the Federal Communications Commission in examining cable television systems. See FCC 1994. See also Katz & Summers 1989.

²⁰ 1999 sales data for cable and telephone systems is used for this comparison. While data are available for both markets up through 2000, using the most recent year would skew results considerably, as cable prices reached an astronomical \$5,923 per subscriber. See FCC 2002, Table B-5.

TABLE 3. CAPITALIZED RENTS IN RBOC AND CABLE TV NETWORKS (1999)

<i>Asset</i>	<i>Market Value</i>	<i>Capital Cost</i>	<i>q-ratio^e</i>
RBOC	\$2,931/line ^a	\$2,311/line ^b	1.27
Cable Television	\$3,995/subscriber ^c	\$1,000/subscriber ^d	4.00

Sources: (a) Legg Mason 2002, p. 56; (b) Legg Mason 2001b, “gross plant/line” average value over twelve ILECs studied; (c) FCC 2002, Table B-5 (d) FCC 1999, Chart 2; includes cost of 2-way digital; (e) see text for definition.

As mandated by unbundling rules, the DSL supply chain is modular. The standard connection therefore requires the cooperation of three independent firms: the ILEC, owning the network, a DSL provider, often owning some facilities (such as digital switches co-located in ILEC central offices and fiber transport lines) but relying heavily on unbundled ILEC-network elements for the “last mile,” and an ISP providing a retail service interface with users. Successful interaction of these suppliers with each other and with the consumer has proven challenging; widespread customer confusion has resulted, severely impacting the roll-out of service.²¹ Cable operators, unburdened by sharing requirements and vertically integrated into retail service provision, enjoy clear lines of responsibility. One way in which this has ironically manifested itself is in cable’s superior coordination in the modem equipment market. Without regulatory constraints, cable operators have established *open* (non-proprietary) standards for modems that invite multiple equipment manufacturers to compete on cost and quality. “Open” telephone industry providers of DSL have lagged far behind this effort. (Bittlingmayer & Hazlett 2001)

While cable’s regulatory status has assisted it in the broadband race, there is evidence that the mere threat of “open access” rules for cable operators has negatively impacted investment incentives. This evidence is gleaned from financial markets, where open access events are negatively correlated with returns not only for specialized cable ISPs like @Home decline but with those for Internet infrastructure and content providers. (Events wherein open access rules move forward show no reaction among the infrastructure/content plays; events wherein open access rules are set back exhibit positive infrastructure/content returns. See Hazlett & Bittlingmayer 2001)

²¹ Among myriad reports documenting the difficulties DSL suppliers have in coordinating their activities, this is typical: “In theory, DSL promises large cost savings for companies of all sizes, compared to T1. But installation woes and poor performance render it more trouble than its worth... ‘Service-level agreement [SLA] issues remain very fuzzy. Who is responsible when something goes wrong?’ asks Andy Bose, CEO of New York-based research firm AMI Partners... ‘The local phone company called six distinct times to schedule installation. I kept telling them, ‘It’s already installed been scheduled. You’ve already called. You’ve already installed it,’ says Eileen Zimble, AMI’s production manager. Zimble says she got about the same number of calls from the DSL provider and ISP, both uncertain as to where AMI’s order stood.” Jennifer Jones, *DSL in Distress*, INFOWORLD (Dec. 4, 2000), 40.

More pervasively, the limited bandwidth afforded cable modem service by cable operators illustrates how nervous network creators are about common carrier-type regulation. Just one TV channel (6 MHz) of the standard 125-channel cable TV system (750 MHz) is devoted to downstream Internet access. On a revenue/MHz basis, it appears that cable operators (and monopoly operators much more than overbuilders) tend to under-allocate radio spectrum to high-speed access. While cannibalization of video revenues is the oft-cited rationale for such parsimonious commitment to the emerging technology, this explanation is incomplete: digital cable, pay-per-view and video-on-demand can also cannibalize (or compete with) other video revenues. Yet, these other services are allotted far more bandwidth, absolutely or adjusting for service revenues, than Internet access.

The key distinction is regulatory: only with Internet access does the cable operator open itself up to potential common carrier regulation. To limit this apparent source of appropriation, already visible in the “open access” movement (attempting to subject cable modem service, but neither POCs nor advanced cable services, to mandatory unbundling²²), cable operators select system architectures that rigidly under-allocate radio spectrum to the at-risk service. Consistent with this behavior, cable operators vehemently resist any legal designation as common carriers. (See, e.g., AT&T 1999).

The impact of open access rules in slowing the creation of advanced services over local exchange systems is also becoming evident. While unbundling is required for POTS (plain old telephone service) as per the mandate in the 1996 Telecommunications Act, the Federal Communications Commission has explicitly declined to extend these requirements to advanced services (such as high-speed data networks).²³ Of course, the unbundling and separate subsidiary requirements for Bell companies²⁴ achieve some of the same limits on vertical integration and long-term contracting that explicit regulation of advanced networks would. This is why the relaxation of existing rules for high-speed data is both highly prized by Bell companies and intensely opposed by others.²⁵

The difficulties in regulated unbundling of telecommunications networks may be observed in the current experience in POTS or POCs. Complex network sharing arrangements stymie a wide range of economic activities:

²² OpenNET, the coalition lobbying for “open access” rules, puts its case to the FCC this way: “Cable operators have chosen to become common carriers by offering a telecommunications service over their existing cable system infrastructure. The [Communications] Act requires that the nature of the service, not the underlying facility nor the particular provider, determines a provider’s regulatory classification. The Commission should act immediately and declare that the Title II nondiscrimination and interconnection obligations that govern telecommunications common carriers apply to all cable broadband providers offering broadband Internet transport, which is clearly a telecommunications service.” OpenNET 2001, 4.

²³ Federal Communications Commission, *In the Matters of Application Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket Nos. 99-147 and 96-98 (Dec. 9, 1999). See also Kahn 2001, 11, 24.

²⁴ See, generally: Huber, Kellogg & Thorne 1999.

²⁵ *Bells, Rivals Gear Up for Battle*, WASHINGTON POST (Feb. 28, 2001).

- Introducing competitive POTS via network sharing mandates is proving very difficult to effect in foreign markets, particularly those throughout Europe.²⁶
- Introducing competitive POCS via network access mandates (Video Dialtone and Open Video Systems) garners trivial subscribership and virtually no actual sharing of facilities despite FCC regulatory proceedings stretching from 1987 (and bolstered by the 1996 Telecommunications Act). Leased access, a channel unbundling requirement for cable systems in effect since 1972, has proven even less successful. (Hazlett & Bittlingmayer 2001)

Perhaps the most vocal advocate of extensive unbundling requirements for local telephone systems is AT&T, a long-distance carrier with extensive cable television holdings.²⁷ It acquired these cable systems primarily in mergers with TCI and MediaOne. In arguing the public interest benefits created in the latter purchase before the Federal Communications Commission in September 1999, AT&T was careful to specify the economic advantages of vertical integration in providing cable telephony (using cable system infrastructure to provide facilities-based competition to an ILEC). In considering whether AT&T could, as an alternative to merging with MediaOne and owning its cable systems, achieve the same economic benefits via a sharing agreement, it wrote:

Any joint venture that contemplates the provision of services by one party over the facilities of another party raises difficult issues that are likely to lead to protracted negotiations. And in the current environment of rapid and increasingly unpredictable evolution and convergence in technologies and consumer demands, reaching agreement on a joint venture contract for the provision and marketing of telephony and other services over cable is inherently and especially difficult....

[T]echnologies and services are rapidly evolving and converging; hence, no one can reliably predict what business models, service offerings or technologies are likely to emerge as successful even over the next few years... [T]his uncertainty makes it extremely difficult for a cable company that owns

²⁶ “Local loop unbundling is almost dead... This time last year, you may remember, the European Commission was getting very excited about mandating local loop unbundling right across the European Union. Local exchanges were to become low rent hotels. At reasonable cost, new entrants could drive up and apply for a room in the incumbent’s abode... At that time, Jack McMaster, chief executive of KPNKwest, had one of the more ambitious pan-European unbundling plans. By October 2000, he’d cancelled most of them... ‘What we got wrong was that we didn’t realise how successful the incumbents were going to be at dragging their feet,’ McMaster reflects. ‘When we announced we were going to pull out, people asked what had changed in such a short space of time? The answer was we got the crap kicked out of us.’ ... If, as a potential unbundler, you are faced with the full obstinacy and immovability of an incumbent, unbundling of the local loop becomes a very tall order indeed.... Roughly a year ago more than 40 operators were involved in a negotiation process with BT and Oftel to agree [to] the terms and conditions which would enable them to unbundle BT’s copper. With what any other company might have viewed as a major commercial opportunity, BT adopted the foetal position, stuffed its thumb in its mouth and regressed back to the 1970s.” Ian Scales, *Bottom Line: Toothless Watchdogs*, CI-ONLINE (Aug. 15, 2001), www.totaltele.com/view.asp?ArticleID=42417&pub=newci&categoryid=735.

²⁷ AT&T’s cable television systems have recently been the subject of a merger offer by Comcast.

facilities potentially capable of providing multiple existing and future services, and a telephone company that wants to use those facilities to compete with the offerings of an ILEC (whose facilities have multiple uses under one ownership), to agree in advance on limits on the services that the telephone company will offer and the amount of cable bandwidth it may use (AT&T 1999, 19).

The cable company will, of course, insist on some limits – an arrangement free of limits that encouraged a venture only partly owned by the cable company to compete directly with the cable company's 100%-owned core business would surely incur the wrath of shareholders. And it is far too early to predict reliably which services – telephone, video, interactive online or other – will achieve the greatest commercial success, and thus how much of the cable bandwidth should be allocated to each service. (AT&T 1999, 21-22)

On the question as to whether vertical integration between the network owner and the ISP having responsibility for retail customer relations is efficient, AT&T wrote:

The relationship between AT&T and @Home is highly interdependent, and the two parties have negotiated a revenue split that reflects not the cost of transport but rather the investments and expertise that each side brought to the table... This unique relationship cannot be duplicated by government mandate.

Pricing regulation is an extremely complex process, both procedurally and politically. A new regulatory structure, similar to the structure in place for telephone service, would need to be developed to handle the Internet – a regulatory nightmare that could take years to put in place.... [C]ommon carrier regulation is completely unnecessary, and actually harmful, if applied in a nascent, competitive marketplace like that for Internet services. (AT&T 1999, 105-6)

The symmetry with arguments against unbundling ILEC networks is striking. When investing, all firms – ILECs, CLECs, cable operators, or IXC's -- are quick to cite the tax provided by network sharing obligations. They anticipate that compliance costs (negotiations, litigation, regulatory process) will be high, that the uncertainty produced by rule changes adds substantial project risk, and that the availability of their capital for the use of rivals (at the option of the rivals) constitutes free riding. All factors discourage investment. Since the premise of such regulation is that only the firms selected for sharing requirements will build facilities (hence, the need to open them to competitors), this generally implies that total investment in new infrastructure falls.

III. Rent Seeking To Raise Rivals' Costs

The positions advocated by firms signal the likely effect of public policies. Because managers are obligated to advance the interests of their shareholders, they reliably seek to

enact rules awarding their firms advantages. These may enhance profitability either by lowering costs (say, decreasing taxes or increasing efficiency), or by increasing revenues. Regulations that asymmetrically burden rivals achieve the latter by allowing the successful petitioner to gain market share.²⁸

The intense public policy debate in broadband has fleshed out a revealing – and symmetric – set of economic interests.²⁹ The campaign to establish unbundling requirements for cable television systems was spearheaded by GTE and AOL, and then joined by a host of ILECs, CLECs and ISPs. The OpenNET coalition was formed as an “AOL/ISP/phone-company” group to lobby for open access, soon to be joined by the “BOC-backed, iAdvance.” (Espin 2000, 11) AT&T, as the leading cable operator, responded by backing “Hands off the Internet.” (*Ibid.*, 12)

A mirror image appears in the battle over potential deregulation of telco broadband (DSL). There, Bell companies aggressively advance their agenda to limit unbundling obligations and structural separation rules by advocating passage of Tauzin-Dingell. Countering this agenda is AT&T, spending heavily for campaign contributions, lobbying, consulting, and advertising aimed at undermining support for the measure. (Alvarez 2001) Going further, AT&T launched a campaign in 2000 to lobby state regulators to force vertical divestiture of local Bell companies, quarantining local access in a separate “wholesale” service provider. Thus far, twelve states are considering this structural separation proposal, although none has yet to adopt it. (Dreazen 2001; Cowles & Winogradoff 2001) AT&T has self-identified as a direct competitor to Verizon, SBC, US West and BellSouth, and specifically noted that its rivals stood to gain from restricting efficiencies it enjoyed in providing cable telephony. (AT&T 1999) The reverse is also true.

CLECs are consistently in favor of unbundling regulation, advocating both “open access” in cable markets and extensive restrictions on ILECs. As seen above (in a Cox Cable SEC report), they will also note the burdens imposed by unbundling obligations on entrants. CLECs benefit from both low price access to rivals’ facilities (i.e., inexpensive inputs) and by limits on vertical integration that create costs for direct competitors.

A distinct pattern emerges (See Table 4). Firms consistently advocate unbundling regulation for rivals while opposing it for themselves. Assuming that the managers of such firms are performing their fiduciary obligations to shareholders, it is apparent that industry executives have achieved consensus: unbundling obligations are bad for business. More pointedly, unbundling obligations are bad for consumers. This is deduced by virtue of the

²⁸ AT&T notes that when its direct competitors argue in favor of regulating AT&T (through antitrust or regulatory mandates) it reveals that such policies will produce benefits for such firms by reducing the efficiency of AT&T. Speaking of opponents to its merger with MediaOne, including “GTE and other ILECs,” it writes: “The private interests of these firms, unlike the interest of the consuming public, are disserved by any increase in competition for their services. If the incumbent providers truly thought that the proposed Merger was unlikely to intensify the competition facing them, then their logical reaction would be private rejoicing at the folly of AT&T’s costly undertaking.” (AT&T 1999, 3, 8.)

²⁹ “The country’s regional Bell telephone companies and the cable giant AT&T are engaged in a furious fight on Capitol Hill over the rules managing the rollout of high-speed Internet access into Americans’ homes, in the process reopening one of the most bitter lobbying clashes of the last decade.” Alvarez 2001.

impact of regulations on direct rivals. If the best intelligence known to AT&T indicates that local telephone access will be provided more efficiently under structural separation, advocating such a policy – and investing substantial resources to pursue it – would not only violate the profit maximization assumption, but legal obligations to shareholders. Similarly, if ILECs promoting cable “open access” rules were to do so

Table 4. Broadband Unbundling: A Rent Seeking Game

Sector	Rival	Policy Advocated	
		For Rival	For Itself
Cable	DSL	Regulate	Deregulate
ILECs	Cable	Regulate	Deregulate
CLECs	Cable	Regulate	Deregulate
CLECs	ILECs	Regulate	Deregulate

understanding that cable network unbundling promotes customer satisfaction, they would be actively undermining demand for their competing DSL service. The implication is that telcos believe that unbundling rules will limit the quality of the networks owned by rivals..

There is a cross-check on this analysis. While players not directly competing in the broadband race tend to economize on resources by avoiding contentious regulatory disputes, one key player that has engaged on this issue is Intel, the leading maker of integrated circuits (chips). With with diverse interests spanning the computing and telecommunications landscape, Intel prospers when network competition is intense and efficient solutions are widely available to the mass market. Intel’s expert position on the broadband regulatory issue is that unbundling of high-speed services is unwise in cable or telephone systems.³⁰ As an expert proxy for consumer interests, Intel’s advocacy carries great weight.³¹

IV. Competitive Analysis

If one proceeds down the checklist of efficiency and anti-competitive rationales for vertical integration, the market for residential broadband service does not have the structure that would justify unbundling mandates for either cable modem service or DSL . First, market conditions suggest vertical integration offers crucial efficiencies. Substantial

³⁰ “Dr. Grove stated that Intel’s goal is to make true broadband widespread and affordable... Intel believes that incumbent companies should not have to unbundle new fiber and DSL equipment as long as they are required to make their existing “copper” lines and central offices available to their competitors. He stated that imposing such “unbundling” regulation on this discretionary investment could unnecessarily discourage DSL deployment...” Ex parte report of a meeting between Intel executives and FCC Chair Michael Powell filed by Intel (June 20, 2001).

³¹ Intel’s deregulatory approach to broadband networks has been endorsed by other leading firms in the computer sector including Cisco, Microsoft, Compaq, Dell, and Hewlett Packard. See XXX.

amounts of specific capital must be invested to create broadband networks, and open access to such facilities undermines risk-taking to create them. Moreover, cable's vertically integrated services have been relatively successful in building and utilizing such networks, while DSL has encountered severe marketing and service problems widely attributed to its truncated linkages and diffused responsibilities. This smacks of the classic problem of incomplete contracts, where reliance on complementary producers is undercut due to transaction costs. Here, due to regulation, no contracts are allowed. And reliance on non-integrated partners has proven extremely disruptive.³²

Second, regulatory evasion – funneling costs into the unregulated vertical market to raise “costs” in the regulated market – is not plausible in either cable or telephone markets. In cable, rate regulation was effectively repealed in the 1996 Telecommunications Act (as of March 31, 1999). In local telephony, rates are regulated principally by price caps. As opposed to rate-of-return regulation, such rules provide no reward for shifting costs. In states where rate-of-return rules are still in place, rate caps could (and should) replace them, obviating the cross-subsidy problem across jurisdictions.

Third, the dynamic nature of the market puts regulators in a difficult position for crafting rules. In 1999, Internet access providers Covad, Northpoint, Rhythms, and @Home were busy signing up customers and each company had a market capitalization of billions of dollars. Today each firm has filed for bankruptcy protection. With such market volatility, determining the efficient terms of vertical combination or cooperation – no easy task in the calmest of markets -- is even more difficult than usual.

Finally, there is no monopoly. Whatever the eventual market power exercised by dominant players, the broadband race today features multiple players vying for market share. Not all residential customers face ideal choices, and price discrimination (higher prices where competition is less) can be observed. But rivalry is driving high growth, and measures intensifying the race by introducing additional facilities-based competitors are the prudent policy approach.

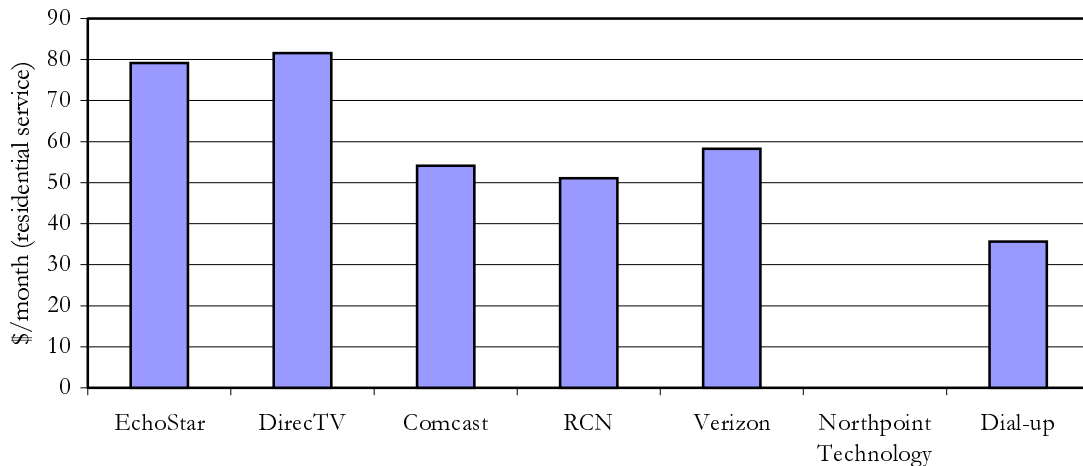
Even a cursory examination of the choices offered residential broadband customers suggests interesting policy alternatives. Figure 1 displays the various platforms offered households in Washington, D.C. (See Appendix 1 for more detail.) The cable incumbent, Comcast, offers high-speed Internet access for about \$54 per month when the upfront installation/modem fee is amortized over a typical subscriber life. This is about 6% higher than the price charged by RCN, a cable overbuilder available to residents in parts of the city. Both direct broadcast satellite systems (EchoStar and DirecTV³³) offer two-way Internet access with download speeds up to 400Kbps, pricing the service (including substantial up-

³² This was poignantly demonstrated, for instance, when it was revealed in late 2000 that many DSL wholesalers had been keeping ISP customers on the books far beyond the point at which they became “bad debt.” While such firms sought to impress financial markets with “subscriber” and “revenue” growth, the ultimate problem created many spill-over costs along the DSL supply chain. See, eg., Sam Ames and Corey Grice, *Covad Unplug Late-paying ISP Partners*, CNET NEWS.COM (Feb. 8, 2001), <http://news.cnet.com/news/0-1004-200-4761647.html?tag=prntfr>.

³³ EchoStar proposed purchase of DirecTV is currently being evaluated by the FCC and U.S. Department of Justice Antitrust Division.

front costs) at approximately \$80 per month. Verizon's price for DSL is about \$58 monthly, including standard connection costs. By comparison, the monthly cost of a second residential telephone line plus an ISP dial-up connection (AT&T World Net) is about \$35.

Figure 1. Fees for Stand-Alone High Speed Access and Dial-up Narrowband (Washington, D.C. 2001)



It is difficult to identify a monopoly bottleneck in the current competitive landscape. There are, however, policy measures which could accelerate incentives for incumbents to build-out their networks and reduce entry barriers for further competitors. On the former, the Federal Communications Commission could conclusively determine that unbundling obligations for high-speed services in either cable or telephone systems are not in the public interest. This would reduce the risk premium associated with anticipated appropriation via network sharing mandates, and – *ceteris paribus* – increase investment incentives for both cable modem and DSL networks.

The FCC could also place another competitive choice in the residential broadband mix by issuing licenses to Northpoint Technologies.³⁴ This firm has developed a technology to re-use the spectrum allocated to DBS systems through a combination of satellite and terrestrial facilities, and the FCC has found that the delivery system works (meaning that it creates only de minimus interference with existing users).³⁵ Yet, despite a seven year effort to obtain licenses, the Commission has not decided whether to issue the license requested by

³⁴ Northpoint Technology is not associated with NorthPoint Communications, a bankrupt DSL provider.

³⁵ Peter J. Brown, *Northpoint Technology Readies Broadwave Wireless Service*, BROADBAND WEEK (Nov. __, 2000), 54.

Northpoint, or to allocate a new set of licenses using the Northpoint spectrum-sharing system, issuing these licenses by auction.³⁶

Germane to the discussion here is that Northpoint's market entry will be delayed by years if the Commission undertakes a new rule making and prepares to issue licenses by competitive bidding. This delay could be avoided by promptly licensing Northpoint, an applicant that has requested market entry – without mutually exclusive rival applications – since 1994. Such action would insert a new competitor into the broadband marketplace, one that has announced plans to provide low-cost residential service; for example, basic cable service and up to 100 hours of high-speed one-way Internet access for \$39 per month.³⁷

The policy, of course, can be extrapolated: the FCC should make abundant spectrum available for all non-interfering entrants. The regulated communications spectrum is extensively under-utilized, and far greater capacity is available under a more liberal allocation regime. (Hazlett 2001a) Fixed and mobile terrestrial wireless, satellite, and other innovative approaches to broadband access would fortify the competitive choices faced by households. One particularly rich source of under-utilized spectrum having excellent propagation characteristics for wireless broadband access is the television band. As 87 percent of U.S. households receive their TV signals not off-the-air, but via cable or satellite television subscription services, as of year-end 2001, a reallocation of these airwaves would produce enormous social gains. (Hazlett 2001b)

The weakness of the choices facing broadband customers involve coverage. RCN, for instance, is constructing competitive cable facilities in many major markets, but relatively few U.S. households have such options available to them. Regulatory burdens are a major hurdle for such firms as RCN, which recently abandoned a two-year effort to obtain a franchise in Philadelphia.³⁸ Municipal governments, on their own or under mandates from state statutes, routinely engage in rent extracting franchise procedures that perversely hold-up competitive entrants, protecting incumbents with market power. (Hazlett & Ford 2001) This could be remedied by federal legislation mandating timely, non-burdensome franchises be issued to all applicants, and by relaxation of unbundling requirements in federal Open Video System franchises.

While the issue has yet to arise formally, the antitrust treatment of a DBS merger may materially impact local broadband markets. Currently, DBS broadband access is relatively

³⁶ As I argued in an analysis submitted to the FCC in March 2001 on behalf of Northpoint, this latter approach would appropriate the firm's substantial investment in technology (including license-specific investments in the demonstration of their system, submissions for interference adjudication, and negotiation of sharing arrangements with incumbent spectrum users), discouraging wireless technology creation. (Hazlett 2001a)

³⁷ www.northpointtechnology.com/html/broadwave.html (visited Feb. 17, 2001).

³⁸ Ken Dilanian and Wendy Tanaka, *RCN Pulls Cable-TV Proposal*, PHILADELPHIA ENQUIRER (Feb. 15, 2001); *RCN to Philly: See Ya*, BROADBAND WEEK (Feb. 19, 2001), http://www.broadbandweek.com/news/010219/print/010219_news_rcn.htm; The Insider, *Saidel Slams Shunning of RCN by Philadelphia*, PHIL BUS J (Feb. 19, 2001), <http://philadelphia.bcentral.com/philadelphia/stories/2001/02/19/tidbits.html>.

See also: *RCN Annual Report for the Year Ended Dec. 31, 2000 -- 10K-K405*, filed with the Securities and Exchange Commission (April 2, 2001), 15-17.

expensive and relatively slow. With EchoStar's recent offer to purchase DirecTV, a merger currently under antitrust review, the capacity available to a serve a given customer of the merged firm – both in orbital slots and allocated spectrum – would instantly double. This added capacity would create two interesting outcomes. First, bandwidth available for high-speed Internet access via satellite would become much more abundant. Second, bandwidth available for local signal delivery would also increase, driving DBS to offer local TV channels in many more markets. On the other hand, the number of multichannel video competitors would be reduced.

V. Conclusion.

By focusing on measures to eliminate barriers now blocking additional coverage and queued broadband providers, policy makers may invigorate local competition for broadband service. There are many potential competitors to add to the mix, and no downside risk in opening markets. The alternative is to regulate networks. These are moving targets, and both economic theory and the available evidence strongly suggest that investment declines with the degree of sharing mandated. If regulators desire to appropriate investor rents, waiting until the investment is sunk before revealing their plan appears the strategic approach.

Three key attributes of the residential broadband access market support deregulation of unbundling mandates : multiple platforms; relatively low penetration; rapid growth. These factors, combined with economic evidence on regulatory effects , allow for informed policy conclusions even in the face of the maelstrom of turmoil witnessed in technology, operating, and financial markets.

In the race for market share, competing technologies invest to create critical mass for their rival platforms. The high rate of subscriber growth, from a currently modest base, suggests that dynamic incentives to deploy broadband are relatively more important than measures designed to improve allocative efficiency. To regulate competitive superiority at this stage lowers returns to successful network innovators and thereby hinders market formation. This is the logic behind former FCC Chairman William Kennard's rejection of "open access" rules for cable systems in 1999 on the grounds that it would amount to regulating a "no-opoly."³⁹ The logic holds yet today.

³⁹ "‘Today,’ [Kennard] said, ‘we don’t have a duopoly, we don’t have a monopoly, we have a no-opoly.’” Federal Communications Commission Press Release, “Chairman Kennard Calls on Cable Franchising Authorities to Promote National Broadband Policy; Vows Continued Consumer Protection” (July 15, 1999); http://ftp.fcc.gov/Bureaus/Miscellaneous/News_Releases/1999/nrmc9041.txt.

APPENDIX 1. PRICE AND SERVICE COMPARISONS FOR RESIDENTIAL BROADBAND
(SEPT. 2001; WASHINGTON, D.C.)

<i>Firm</i>	<i>Service</i>	<i>Equipment Cost (including installation)</i>	<i>Stand Alone Monthly Access Fee (with amortized upfront costs**)</i>	<i>Stand Alone Monthly Video Fee</i>	<i>Bundled Monthly Fee</i>
Starband (Dish)	DBS 2-way	\$549	\$69.99 (\$79.14)	\$39.99 (86 video channels plus 20 audio)	\$78.00 (\$87.15)
DirecPC (DirecTV)	DBS 2-way	\$698	\$69.95 (\$81.58)	\$39.99 (72 video channels plus 37 audio)	\$109.94 (no package discount) (\$121.57)
Comcast – Montgomery County	Cable modem	Internet: \$149.00	\$49.95 (\$54.09)	\$41.95 (81 channels)	\$86.90 (\$91.04)
Starpower (RCN)	Cable modem	\$39.95	\$49.95 (\$51.09)	\$34.95 (96 channels)	\$84.90 (\$86.04)
Verizon	DSL	Installation kit :\$0 Modem: \$200 Activation: \$50 Ethernet card: \$49.99*	\$49.95 (\$58.28)		
Comcast— D.C. (AT&T)	Cable modem	n.a.	Not yet available in D.C.	Not yet available in D.C.	n.a.
MVDDS	Northpoint Technology	n.a.	n.a.	\$19.95 (96 channels)	\$39.00 (64 channels, 100 hours)

*\$49.99 EtherFast 10/100 PC Card from Linksys at www.circuitcity.com; Verizon activation package, except Ethernet card, free until 10/31/01. http://www.bell-atl.com/infospeed/more_info/pricing.html (visited Sept. 27, 2001)

**Up-front costs for cable amortized over 36 months, straight line; DBS costs amortized over 60 months, straight line. This reflects the standard longevity of customers. (Bear Stearns 2001)

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