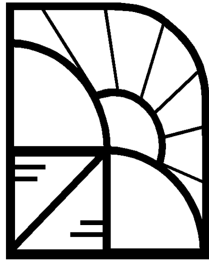


PHOENIX CENTER POLICY PAPER SERIES

*Phoenix Center Policy Paper Number 12:*

# *Why ADCo? Why Now?*

## *An Economic Exploration into the Future of Industry Structure for the "Last Mile" in Local Telecommunications Markets*

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George S. Ford, PhD
Lawrence J. Spiwak, Esq.

(November 2001)

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## *Why ADCo? Why Now?*
## *An Economic Exploration into the Future of Industry Structure for the "Last Mile" in Local Telecommunications Markets*

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*Abstract:* This Policy Paper discusses important economic characteristics of local exchange markets and the firms that participate therein. First, this Policy Paper, building on the work in PHOENIX CENTER POLICY PAPER NO. 10, explains that entry into the local exchange market requires large fixed and sunk costs, making entry risky and necessitating scale economies. Consequently, only a few local access networks can supply the market. These few local access networks cannot be small, however, because a large market share is required to realize sufficient scale economies to effectively compete with the Incumbent Local Exchange Carrier or "ILEC" and survive.

Secondly, using publicly available data from the Federal Communications Commission and industry filings with the Security and Exchange Commission, this Policy Paper explains that acquiring sufficient market share in network services to realize scale economies may be difficult for entrants who either attempt to purchase unbundled network elements from the incumbent or attempt to build their own network from the ground

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up. Instead, given the substantial scale economies required in the local exchange network, it may not be possible for a single carrier to acquire sufficient retail market share in a timely manner to exhaust economies of scale in its wholesale network. An integrated firm supplying the wholesale market, in an effort to expand output, is conflicted; the integrated firm's retail market share raises the opportunity cost of wholesale supply.

Accordingly, this Policy Paper shows that if economies of scale are sufficiently large, reaching a scale of operation that allows the entrant to compete with the ILEC may be best achieved through the entry of an Alternative Distribution Company or "ADCo", which is a wholesale-only "carriers'-carrier" for the proverbial "last mile." (This is a very different concept from a "LoopCo," which is formed via the structural separation of the ILEC's network facilities and marketing operations.) The ADCo can consolidate the consumer demand held by retail CLECs, thereby reducing risk and costs by expanding output quickly. The disincentives to wholesale supply possessed by the integrated firm, furthermore, do not exist for the ADCo, and therefore the ADCo – unlike the ILEC – has no incentive to sabotage its customers (*i.e.*, the ability to increase or raise the cost of a rival's key input of production by non-price behavior.) As a result, while the number of local access networks the market can sustain may be *few*, the exclusively wholesale nature of the ADCo nonetheless permits the number of providers of advanced telecoms products and services to be *many* (the *raison d'être* of market "restructuring").

Accordingly, given the existence of these discriminatory incentives resulting from the current and foreseeable economic conditions of the U.S. telecommunications industry, the most probable and viable long-term, competitive market structure involves a substantial presence by an unintegrated, but larger wholesale supplier[ǂ] – in other words, an ADCo – to function

[ǂ] By "large" we mean large enough to achieve sufficient economies of scale for the market being served. While our focus is generally on the last-mile or last-yard, economies of scale can be substantial in other areas. For example, the systems and electronic interfaces required for a CLEC to successfully transact with an ILEC may be subject to scale economies. If true, then this "provisioning" interface may be best provided on a wholesale basis.

efficiently. As such, their presence in the market should be welcomed and encouraged.

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## I. Introduction

It is now more than five years since the passage of the landmark Telecommunications Act of 1996, but instead of flourishing competition, the competitive local carrier sector is in a financial meltdown.[1] So what happened?

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[1] For example, according to Webmergers.com (www.webmergers.com), at least 555 Internet companies have folded since January 2000. Moreover, in the first half of 2001 alone, over 48 infrastructure providers have gone out of business (up from 17 shutdowns for all of 2000), and 34

(Footnote Continued. . . .)

Basically, it comes down to several fundamental misconceptions about the fundamental economics of the telecoms business by all of the major stakeholders, including Wall Street, policy-makers, and would-be entrepreneurs. Namely, it appeared that everybody erroneously believed that: (a) entry into the local market would be relatively inexpensive; (b) the market immediately would be capable of sustaining multiple telecoms networks; and (c) as a result of their desire to enter the long-distance business, incumbents would gladly embrace competitive entry.[2]

Hardly. As this paper will discuss, (a) entry into the local sector is an extremely *expensive* business, requiring firms to incur huge sunk costs and achieve scale economies quickly; (b) under current and foreseeable market conditions, local markets will only be able to sustain a few "last-mile" access networks (*i.e.*, high concentration); and (c) incumbents were prepared to – and in fact did – go to great lengths in order to deter entry.[3]

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access providers went out of business (up from 19 for all of 2000). Unfortunately, however, it does not look like things are going to improve any time soon. *See, e.g.*, Ann Davis, *Upstart Phone Companies Find Competition Just Got Grimmer*, WALL STREET JOURNAL (1 October 2001).

[2] *See, e.g.*, Alan Sloan, *Dumb Deals 101*, NEWSWEEK (Sept. 10, 2001) at pp-38 –41.

[3] Unfortunately, public policies did little to help the process either. For example, on the Federal level alone, some of the major U.S. telecoms policies that have actually *increased* – rather than appropriately reduced – entry costs and risks for new firms include, but a certainly are not limited to: (1) Permitting the near total reconcentration (*i.e.*, state-sponsored horizontal market allocation) of the U.S. incumbent telecoms, cable and radio industries; (2) Failing to take unbundling and collocation efforts seriously (only a pathetic amount of all U.S. access lines have been made available on an unbundled network element basis to date); (3) Prematurely permitting dominant incumbents to re-vertically integrate in several states before local markets are competitive (*i.e.*, the incumbent should be unable to engage in strategic, anticompetitive conduct, even if it tries); (4) Politicizing universal service programs to protect pet constituencies (thus making these programs a self-defeating exercise); (5) Engaging in numerous clandestine "back room deals" among major industry players (*e.g.*, access charge reform via the so-called "CALLS" proposal), thus depriving the public of procedural due process (indeed, former FCC Chairman Reed Hundt's book is nothing but a walking *ex parte* violation – *and he is actually proud of it*); (6) acting as a "frequency monopolist" and therefore choosing to sacrifice the efficient allocation of spectrum in favor of naked revenue raising – resulting in the delay of a significant chunk of radio spectrum deployed for use; and (7) starting a major "Telecoms Trade War" with America's trading partners, thereby deterring foreign entry and depriving U.S. firms of access to foreign capital (not to mention making it harder for U.S. firms to enter overseas). Whether there will be any significant improvements remains to be seen. *See, e.g.*, Peter S. Goodman, *FCC Sitting Out Telecom War: Bells Stand to Benefit From New Chairman's Neutrality, Economists Say*, WASHINGTON POST (May 3, 2001) Page E1. Given such a cynical litany, it is no wonder why telecoms competition is nascent at best in the United States. As such, if Americans are upset over the financial collapse of the telecoms

(Footnote Continued. . . .)

As such, just as it was prior to 1996, one of the key unresolved issues in telecoms restructuring continues to be the proverbial "last mile"[4] – *i.e.*, that last segment of the network necessary to connect the customer.[5] Indeed, despite the somewhat regular deployment of state-of-the-art national and regional long-haul networks and metropolitan fiber rings by a number of carriers, the deployment of alternative networks comes to a screeching halt when it reaches into the local exchange, leaving dominant control of most switching and transport facilities, and particularly the "last mile" or "last yard" of the local exchange network, to the incumbent local exchange provider ("ILEC"). In order to bypass the economic bottleneck for local access, therefore, the Competitive Local Exchange Carrier ("CLEC") industry has been faced with the core question of transactions-cost economics – *i.e.*, is it more efficient to buy local access via unbundling, special access, *etc.* from the reluctant incumbent (conduct its transactions in the market) or build its own local access network from scratch (bring the transaction out of the market and into the firm)?[6] The problem, unfortunately, is that under current and foreseeable market conditions, neither option is particularly economically appealing.

On one hand, given the incumbents' near complete dominance of the local access market, there really is no competitive "market" where a firm can purchase local access at just and reasonable rates that will be provisioned on a timely basis. Acquiring needed inputs (*i.e.*, elements) from the incumbents at just and reasonable rates and provisioning intervals is no cakewalk either. After all, dominant firms do not typically facilitate the demise of their dominance. This is not an irrational concept, because *no firm will ever be enthusiastic about consciously going against its own self- interests by selling its rivals their key input of production* (*i.e.*, loops). Indeed, while the Telecommunications Act of 1996 ("1996 Act") requires the ILECs to provide such elements, the 1996 Act did little to

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industry, then they must understand that such poor performance is a direct result of the flawed structural policies of the last several years and *not* the result of a CLEC industry that is ostensibly uniformly comprised of nothing more than "three guys and a pick-up truck."

[4] While the "last mile" of the local exchange network is perhaps the most challenging trial for competition policy, the supply-side economics of many other components of the local exchange network, including switching and transport, also prohibit large numbers competition.

[5] *Readers' note:* The "last mile" is a term of reference and is not meant to describe a "measured mile." Instead, the "last mile" can be as small as a few feet or yards.

[6] *See, e.g.*, Oliver Williamson, THE ECONOMIC INSTITUTIONS OF CAPITALISM (The Free Press 1985).

fundamentally alter incentives (as described later).[7] So long as this inherent wholesale supplier/retail competitor conflict exists between an ILEC and a CLEC, then the ILECs' ability to manipulate prices for elements and control quality leaves sufficient room for ILECs to sabotage transactions – as defined as the ability to increase or raise the cost of a rival's key input of production by non-price behavior – between itself and CLECs.[8]

On the other hand, as the relative paucity of alternative local networks and rampant bankruptcy in the CLEC industry demonstrates, the economics of self-supply are not particularly compelling either. As explained below, telecoms is an extremely expensive business, and many CLECs are discovering to their dismay and chagrin that they cannot achieve sufficient economies of scale, scope, or density to warrant the capital required to build various components (even relatively small components) of the local exchange network from the ground up. The large sunk costs required to construct local exchange network greatly increase the risk of entry and severely limit the number of financially viable alternative "last-mile" networks in most local markets.[9] Simply put, the supply-side economies of the local exchange market prohibit competition among large numbers of network-based firms. The hope for large numbers competition among network-based firms under current and foreseeable market conditions is sheer fantasy.[10]

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7 Unfortunately, many CLECs' defense to the current financial collapse is that it was not unreasonable for them to base a business plan on a Federal law – enacted by Congress and signed by the President (and upheld as Constitutional by the courts) – that guarantees them the right to unbundled network elements. While this may be true, this is a legal argument – not an economic one.

8 *Readers' note:* The definition of the term "sabotage" articulated *supra* originates in T. Randolph Beard, David Kaserman, and John Mayo, *Regulation, Vertical Integration, and Sabotage*, JOURNAL OF INDUSTRIAL ECONOMICS, (forthcoming September 2001) and will be used *passim*. For a full explanation of sabotage, *see* section IV.D *infra*.

9 Limitations on the number of viable firms are not restricted to the "last mile." Rather, any segment of the network characterized by sunk costs and scale economies has limited opportunities for successful entry. For a thorough discussion of the effects of sunk costs on entry and industry structure, see John Sutton, SUNK COST AND MARKET STRUCTURE (Cambridge, MA: The MIT Press, 1996); *see also*, Jerry B. Duvall and George S. Ford, PHOENIX CENTER POLICY PAPER NO. 10, *infra*, for a similar analysis applied to the communications industries.

10 This fantasy of large numbers facilities-based competition reaches high into the telecommunications industry and policy elite. *See, e.g.*, Remarks of Michael K. Powell, Chairman, Federal Communications Commission, National Summit on Broadband Deployment, Washington,
(Footnote Continued. . . .)

Accordingly, the tenuous relationship between a reluctant ILEC supplier and its competitor-consumer CLECs, as well as the substantial scale economies and sunk costs required to participate in the local exchange market, suggest that neither of the two alternatives for facilitating competition offer substantial promise as a long-term solution to monopoly in the local exchange marketplace. So what to do? How do we go from "one" firm (*i.e.*, monopoly) to "many" firms (*i.e.*, competition) in an economically efficient manner (the *raison d'être* of market "restructuring")? This Policy Paper will explore the merits of an untapped third option for local access – the Alternative Distribution Company or "ADCo", which essentially is a wholesale "carriers'-carrier" for local network "last-mile" access.[11]

The "carriers'-carrier" is not a new concept to telecommunications. Many long-haul networks, both national and regional, are built and/or operated as a "carriers'-carrier." The economic forces that create a wholesale market in the long-distance industry, where about six nationwide and numerous regional networks support well over 500 retailers, are no less present in the local exchange.[12] Indeed, those economic forces – economies of scale, economies of density, and sunk costs – are even more important in the local exchange than in long-distance, where fiber deployment in metropolitan markets is about twelve times as expensive as long-haul fiber networks.[13] As such, the case for a "carriers'-carrier" in the local exchange market at this stage of the telecoms industry restructuring process is compelling.

More importantly, given its wholesale entry strategy, the ADCo provides a viable economic solution for new entrants to the problems raised by the inherent

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D.C., October 25, 2001; Statement of Ivan Seidenberg, Goldman Sachs Communacopia X Conference, New York, October 4, 2001.

[11] *Readers' note:* An "ADCo" is a very different concept from a "Loop Co." A "Loop Co" is formed via the structural separation of the incumbent's local access network facilities from the incumbent's marketing operations. (*See, e.g.*, Roy L. Morris, *A Proposal to Promote Telephone Competition: The LoopCo Plan* (http://members.aol.com/RoyM11/LoopCo); Maev Sullivan, *Loop Co is the Only Game in Town*, COMMUNICATIONS WEEK INT'L (16 July 2001).) An ADCo, however, is the entry of a completely new firm that contemplates an exclusive wholesale entry strategy for local access from the outset.

[12] *See Trends in Telephone Service*, FCC-Industry Analysis Division, December 2000, Table 10.6.

[13] Dan Sweeney, *City of Lights – The Pricing of Fiber Build-outs: A Special Report*, COMPETITIVE CARRIER (August 21) at 6, 7.

incentive of an incumbent to unduly discriminate to protect its profits. This issue of incentives is key to understanding the current ills of the market, as it is now clear that policymakers significantly under-estimated the significant incentives of the incumbents to unduly discriminate against their rivals (not to mention, as noted *supra*, underestimating the entry costs of the local market). In fact, it is becoming readily apparent that, given the current and foreseeable underlying economics of the industry, no amount of regulation – with perhaps the exception of total structural separation – can ever fully mitigate the cross-incentives of the incumbents' wholesale supplier/retail competitor relationships with CLECs.

To explore the merits of the ADCo in detail, this Policy Paper, using an analysis first set forth in PHOENIX CENTER POLICY PAPER NO. 10, will first briefly explain that given the underlying economics of the market, and that much of the entry costs of a telecommunications network are sunk, industry concentration in telecommunications markets is expected to be relatively high.[14] Accordingly, expecting large numbers competition in telecommunications – particularly large numbers network-based competition – is entirely unreasonable.

Second, this Policy Paper will evaluate (in a summary fashion) the two primary forms of entry observed since the passage of the 1996 Act:

Option 1: Element-Dependent Entry (EDE): An entry strategy where the new entrant relies heavily on the elements of a reluctant incumbent, rather than build their own network, and purchases local access from the incumbent via special access lines, T1's, full resale, individual unbundled network elements or even the entire platform ("UNE-P"), *etc.* This form of entry includes those entrants relying on the elements of the incumbent until its own network is deployed (*a.k.a.* a "smart build" strategy).

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[14] *See also* T. Randolph Beard and George S. Ford, *Competition in Local and Long-distance Telecommunications Markets*, THE INTERNATIONAL HANDBOOK OF TELECOMMUNICATIONS ECONOMICS, ed. by Gary Madden and Scott J. Savage, Brookfield, US: Edward Elgar Publishing, 2001, forthcoming.

Option 2: Network-Based Entry (NBE): A strategy where a CLEC seeks to build its own local access network from scratch with little or no reliance on the incumbent's network.[15]

Third, this Policy Paper will explore the full impact of the incumbents' incentive to frustrate competitive entry by setting forth a simple economic model that analyzes the incentives of a vertically-integrated supplier – *i.e.*, it operates in both the "upstream"/"wholesale" market and in the "downstream"/"retail" market – to provide inputs of production to actual or potential competitors. For consistency with the reality of building local exchange plant, this model assumes that there are economies of scale (or density) in the downstream/retail market.[16] (The model assumes that either economies of scale or density exists, but the term "economies of scale" is used throughout this paper.) Also assumed for modeling purposes is that services are profitably supplied. As the model reveals, *the incentives to supply the "upstream" or "wholesale market" at cost-based prices, thus facilitating competition in the "downstream" or "retail" market, are inversely related to the market share of the firm in the retail market – irrespective of whether the firm is an ILEC or a CLEC* (though the CLEC has no incentive to sabotage its customers). Importantly, the model exposes a contradiction in firm size, which arises from the struggle between economies of scale at the wholesale level and the disincentives to supply elements (broadly defined) due to a large market share in the retail market. *Accordingly, as demonstrated below, the incumbents' incentive to unduly discriminate adversely affects in practice both an EDE and a NBE entry strategy. No CLEC entrant is insulated from the ILECs' inherent incentive to deter new entry.*

Finally, this Policy Paper uses the model to compare the incentives of the vertically-integrated suppliers to those of wholesale-only suppliers (*i.e.*, the ADCo). As explained below, *given the existence of the ILECs' discriminatory incentives resulting from the current and foreseeable economic conditions of the U.S. telecommunications industry, the model suggests that the most probable and viable long-term, competitive market structure involves a substantial presence by an unintegrated, but larger wholesale supplier*[17] *– in other words, an ADCo – to function*

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[15] As noted *passim*, it is high time that we stop thinking about "facilities-based" entry as exclusively "network-based" entry.

[16] Economies of scale describe the relationship between costs and firm/network size. Economies of density describe the relationship of costs and output for a firm/network of a fixed size. Either interpretation of the relationship of cost and size/output is consistent with the analytical analysis of this paper.

[17] By "large" we mean large enough to achieve sufficient economies of scale for the market being served. While our focus is generally on the last-mile or last-yard, economies of scale can be (Footnote Continued. . . .)

*efficiently.* Accordingly, their presence in the market should be welcomed and encouraged.

## II. Basic Issues of Industry Structure and Entry

### A. *Introduction*

Elementary economic analysis can shed considerable light on the long-run structure of the U.S. telecommunications industry – an issue of enormous importance. The role of competition policy is to create an environment in which feasible long-term arrangements that are consistent with robust, and commercially successful, local competition can take place. One example of such analysis is provided in PHOENIX CENTER POLICY PAPER NO. 10 entitled *Changing Industry Structure: The Economics of Entry and Price Competition* by Phoenix Center Chief Economist Emeritus Jerry B. Duvall and Phoenix Center Adjunct Fellow George S. Ford (2001).[18] In this Policy Paper, Drs. Duvall and Ford show that the equilibrium level of concentration in telecommunications markets will be relatively high. *The presence of sunk costs, in any industry, limits the number of firms that can profitably serve a market. The larger are sunk costs, relative to market size, the higher is the equilibrium level of concentration.*

More formally, Duvall and Ford (2001) show (theoretically) that the equilibrium number of firms in a market ($N^*$) is the integer part of

$$N^* = \sqrt{\frac{\phi M}{\kappa}} \qquad (1)$$

where $\phi$ is an index of the intensity of price competition ($\phi \geq 0$, where $\phi = 0$ for Bertrand, or highly intense, price competition, and $\phi = 1$ for Cournot competition in quantities), $M$ is market size, $\kappa$ measures the sunk entry costs, and $1/N^*$ is the equilibrium level of industry concentration (and is equal to the Hirschman Herfindahl Index or "HHI" under the assumption of identical firms).[19] Put

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substantial in other areas. For example, the systems and electronic interfaces required for a CLEC to successfully transact with an ILEC may be subject to scale economies. If true, then this "provisioning" interface may be best provided on a wholesale basis.

[18] http://www.phoenix-center.org/pcpp/PCPP10Final.pdf

[19] The models assume all firms are identical. The Hirschman Herfindahl Index ("HHI"), the sum of the squared market shares of relevant firms, is a commonly used measure of industry concentration.

simply, the number of firms supplying a market is positively related to the size of the market ($M$), but inversely related to the intensity of price competition ($\phi$) and the sunk costs of entry ($\kappa$). *The larger are fixed/sunk costs, other things constant, the fewer the firms that can profitably supply the market and the higher is equilibrium industry concentration. Likewise, the more intense is price competition, the higher is industry concentration.*[20]

The inability of local telecoms markets to support large numbers competition can be illustrated by example. Telecommunications firm RCN targets residential customers in densely populated markets with its own network facilities over which it provides telephone, data and video services. According to its financial documents, RCN has $2.75 billion in plant and passes about 1.5 million homes, or 1.1 million marketable homes.[21] Network costs run about $1,750 per home passed, $2,500 per marketable home, or about $6,500 per customer.[22] A rough estimate of RCN's monthly plant costs (assuming a 15% hurdle rate and 15 year payoff) is about $25 per home passed. Average revenue per subscriber per month is about $130 and direct costs are about 46% of revenues, implying a gross monthly margin of about $68 per subscriber. In order to cover plant costs with its net revenues, RCN needs a penetration rate of about 35%-40% (and that is in the more densely populated markets targeted by RCN over a network capable of generating services worth $130 per subscriber). *Notably, if a 35%-40% penetration is required for profitability, then only two firms can profitably service the same market, and RCN and the incumbent makes two.*[23] To construct an RCN-style network for every household in the U.S., the plant investment and total entry costs would be about $300 billion and $600 billion, respectively.[24] Clearly, network-based entry

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[20] Generally, price competition is expected to be weakest in highly concentrated markets. When entry requires sunk costs, however, this expectation can be invalid.

[21] Marketable homes are those homes that RCN's network can immediately serve.

[22] Values based on RCN's 1998, 1999, and 2000 Annual Reports. For example, between 2000 and 1999, RCN's Plant and Property grew by $1.5 billion while its marketable homes grew by about 550,000. In 1999, RCN's penetration rate into marketable homes was about 40%.

[23] With a reasonable guess of the minimum penetration a firm needs to cover its costs, the number of firms that can operate in a market is (the integer part of) the inverse of the minimum penetration (*e.g.*, 1/0.40 = 2.5).

[24] These investment estimates are rough. Plant investment is estimated by assuming the cost differentials and population distributions across density zones are similar to those estimated by the HAI Model (v. 2.2.2). RCN's current network is assumed to be deployed in the two most-dense zones. Non-plant entry costs are assumed to be about $1 for every $1 of plant (see Table 1).

is incredibly costly and not something that is replicable by numerous firms in the same market.

Similarly, the metropolitan fiber rings and spurs needed to provide service to large businesses are incredibly costly as well. Some fiber companies estimate that fiber deployment in a metropolitan area routinely costs $3 million per mile.[25] Thus, construction of a large metro ring or mesh easily could exceed $100 million.[26] Further, the bulk, if not all, of these costs are sunk. Roughly half of the costs of metropolitan fiber are installation expenses.[27] The services provided over metropolitan fiber networks varies, as does the size and scope of these network. Thus, simple profitability models (like the RCN example above) are difficult to construct. *However, the fact that less than 10% of buildings have fiber drops suggests that the sunk costs in network are sizeable relative to market size*.[28]

The implication of the economic theory is clear: *the number of firms supplying a market is not unbounded when there are sunk costs***.** Given that much of the entry cost of telecommunications network is sunk and large relative to market size, *industry concentration in telecommunications markets is expected to be relatively high.* Indeed, until recently, the presumption was that the local exchange market was a natural monopoly (*i.e.,* $N^* = 1$). While the technology and law governing the telecommunications industry has changed, these changes have not totally altered the supply-side economics of the industry. *Large numbers competition among network-based local exchange carriers is forbidden by the supply-side economics of the industry.*

### B. *Sunk Costs and the Necessity of Achieving Sufficient Economies of Scale and Scope*

The fact that economies of scale (or density) and sunk costs play a key role in telecoms network deployment goes without saying. In order to achieve profitability in a reasonable time-frame, therefore, the large fixed costs of plant must be averaged-out over a large quantity of services that are sold relatively quickly. Ignoring this reality has put many a CLEC into bankruptcy.

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[25] The costs of any particular installation vary widely. *See* Sweeney, *supra* n. 13.

[26] *Id.* at p. 6

[27] *Id.* at p. 7, 9.

[28] *Id.* at p. 9. *See also, CityNet Wins $275 Million in Funding,* WASHINGTON POST (April 10, 2001), p. E5.

An important misconception policymakers and Wall Street have about the telecoms industry is that entry into telecoms is somehow limited to just the cost of network construction and architecture. Quite to the contrary, entry into the telecoms business requires the additional commitment of tremendous fixed and sunk costs to cover the costs of billing systems, regulatory efforts and responses, pre-positive cash flow general administrative costs and, perhaps most significant of all, customer acquisition and retention costs.

For example, Galbi (1999) estimates AT&T's annual marketing expenses to be approximately two billion per year (during the years 1994 through 1997).[29] Galbi (1999) also provides evidence that marketing expenses in the long-distance industry are subject to economies of scale. Other sources indicate that acquisition costs for residential local or long-distance customers are about $150 per customer, virtually all of which is sunk.[30] For larger business customers and buildings, where the stakes and margins are relatively high, the acquisition costs are expected to be sizeable.[31]

Similarly, regulatory costs are non-trivial entry investments. Industry experts estimate that approximately 10% of the entry costs for metropolitan fiber rings and spurs are related to government approval. In some cases, "[d]eliberations involving local government entities, public utilities and private claimants can extend well beyond a year, and in some cases may never reach a successful conclusion, aborting the project before a single fiber can be buried."[32] Clearly, approval costs incurred for a project later abandoned have little or no value, and are thus sunk. As noted *supra*, the average cost of a mile of fiber deployed in a metropolitan market is estimated by some to be $3,000,000, the

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29 Douglas A. Galbi, *Some Cost of Competition*, Unpublished Manuscript (www.galbithink.org), January 25, 1999, Table 1.

30 *See For Whom, the Bells' Toll?*, Bernstein Research, February 1997, pp. 55-6: *See also* Juno Online Services, Inc. Reports Record Third Quarter Results ($116 per sub for internet services; http://www.juno.com/corp/news/1999/earnings.q3.1999.html).

31 *See e.g.*, Declaration of Daniel Kelly and Richard A. Chandler, included with Worldcom Comments, In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Joint Petition of BellSouth, SBC, and Verizon for Elimination of Mandatory Unbundling of High-Capacity Loops and Dedicated Transport, Appendix G, June 11, 2001 and *An Economic and Engineering Analysis of Dr. Robert Crandall's Theoretical "Impairment" Analysis* in the same proceeding.

32 Sweeney, *supra* n. 13 at p. 9.

sunk costs related to regulatory approval are non-trivial and may represent a formidable entry barrier.[33]

Accordingly, the magnitude of non-plant entry costs is sizeable. Table 1 illustrates the proportion of facilities investment (measured as net plant) to total entry costs for a sample of CLECs. Entry costs are measured as the spent portion of capital invested in the firm including debt and equity.[34] As illustrated by the table, investment in plant is typically a very small proportion of total dollars invested. As further demonstrated by Table 1, the ratios of expense costs to plant costs range significantly from ITC's relatively low ratio of 1.5:1 all the way to Covad's ratio of 8:1. On average, however, net plant amounts to about 37% (approximately two-thirds) of total entry costs (for this sample). *In other words, for every dollar of investment in plant and equipment, an additional $2 of entry costs are incurred on average.* There is no reason to suspect that these additional entry costs are less sunk than plant and equipment, but good reason to believe such costs are more sunk.[35]

**Table 1. Entry Costs and Plant**

| | XO | Allegiance | RCN | Covad | McLeod |
|---|---|---|---|---|---|
| Entry Costs (E) | $11,139 | $2,196 | $4,859 | $2,455 | $8,260 |
| Net Plant (P) | $3,505 | $939 | $2,331 | $294 | $3,220 |
| E/P | $3.18 | $2.34 | $2.08 | $8.34 | $2.57 |
| P/E | 31% | 43% | 48% | 12% | 39% |

| | Talk.com | Northpoint | ITC^Deltacom | US LEC | Wgt. Average |
|---|---|---|---|---|---|
| Entry Costs (E) | $429 | $1,029 | $1,036 | $369 | |
| Net Plant (P) | $80 | $455 | $708 | $191 | |
| E/P | $5.37 | $2.26 | $1.46 | $1.93 | $3.12 |
| P/E | 19% | 44% | 68% | 52% | 37% |

When considering the prospects and sustainability of competitive entry in telecommunications markets, therefore, economies of scale and sunk costs cannot be ignored; nor can the focus on such economies and sunk costs be limited to

33 *See* footnote 25 *supra*.

34 All figures provided by company 10-Q forms (June 2001). Entry cost is measured by total long-term debt, other liabilities, and equity investments, minus cash and short-term investments. Plant is measured as net plant.

35 Plant and equipment at least can be sold in some instances.

network investment. Indeed, as revealed in the following sections, the extent of scale economies is an important determinant not only in the level of industry concentration, but the type of firms that exist in equilibrium. As the model illustrates below, size matters, but in conflicting ways.

### C. *Unbundling and the Necessity of Creating Sufficient Non-Incumbent Demand*

One of the centerpieces of the 1996 Telecoms Act is the unbundling obligation imposed on the ILECs. The original idea behind unbundling is that because there are high entry barriers into the local access market, unbundling – *i.e.*, a weak form of divestiture – would permit new firms to "leapfrog" those barriers to accelerate the pace of competition. In its most simple form, unbundling should lead to new network-based competition by providing new entrants initially with the appearance of "ubiquity" and economies of scope necessary to enter a very costly business – *i.e.*, the entrant would first develop its customer base, and (because it has no desire to purchase its primary inputs of production from its rivals) would then build-out as conditions warrant. Such a strategy is often referred to as a "smart-build" approach (though the term has other meanings as well).[36] This is precisely what the FCC did in its *1980 MTS/WATS Resale Decision* to great success for the U.S. long-distance market.[37]

While the development of competition in the interexchange industry provides important insights, it is crucial to understand that the scale (and/or density) economies in the local market are more significant than in long-haul networks. Consequently, it is unclear whether individual firms purchasing unbundled network elements will ever acquire sufficient market share to justify the construction of networks for their *exclusive* use. Without the ability to obtain alternative capacity, however, these firms' dependence on the recalcitrant incumbent will affect adversely their ability to succeed in the long-run.

This is not to say that the unbundling provisions of the 1996 Act are a failure and should be eliminated. Quite to the contrary, unbundling is critical to developing sufficient non-incumbent demand for new network-based facility investment to warrant the entry of an ADCo. That is to say, as demand for network elements becomes less concentrated (*i.e.*, the ILEC does not serve all the

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[36] In some contexts, "smart build" builds refers to a slow, meticulous build out strategy designed to maximize market potential with limited capital resources.

[37] Mark Naftel and Lawrence J. Spiwak, THE TELECOMS TRADE WAR: THE UNITED STATES, THE EUROPEAN UNION AND THE WTO (2001 Hart Publishing) at 208.

customers), the potential for rapid and large migrations of demand off the incumbent's network to an alternative network exists. While the dominant incumbent provider will rarely if ever demand the facilities of an alternative element supplier, without existing demand for elements, the risk of entry is considerable. (The proverbial "build it and they will come" proved successful in Hollywood, but not for CLECs.) Yet, if unbundling migrates substantial portions of telecommunications demand to new entrants, then an ADCo can enter and consolidate (or aggregate) this new non-incumbent demand for network elements dispersed among the various firms who currently purchase UNEs from the incumbent (much like building a shopping center with your anchor tenants already secured). In so doing, network-based entry occurs both in the form of new alternative network construction, but also in terms of new technology investment (*e.g.*, interconnecting a sophisticated database to the incumbents' AIN to permit advanced managed-IP products and services). Large numbers competition occurs at the retail and application level, whereas small numbers competition occurs at the wholesale or network level. This arrangement is most compatible with the underlying economics of the telecommunications industry.

## III. The Current Situation: Entry After the 1996 Act

In this section, this Policy Paper examines two primary forms of CLEC entry strategy observed since the passage of the 1996 Act. Entry strategies are varied, so it is difficult to classify CLECs into broad categories. However, there appears to be two very different entry modes at a high level of generality in use: entrants that depend heavily on ILEC facilities and those that do not. While these entry strategies are apparently quite different, similarities exist between the two. Nearly all entrants, for example, must deal with the ILEC in some way.

### A. *Element-Dependent Entrants or "EDEs" – the "Buyers"*

First, there are those entrants that rely heavily on the elements of the ILEC (the dominant incumbent, integrated supplier) – or, *element-dependent entrants* (EDEs). This group of entrants ranges from those using total service resale, to those entrants combining ILECs' local distribution plant (from local loops to DS3) with self-supplied elements. DSL providers, for example, rely on ILEC loops and colocation space. Switch-based entrants, also rely almost exclusively on ILEC loop plant and provisioning labor (*i.e.,* hot cuts), which is combined with self-supplied switching. UNE-Platform (UNE-P), or the combination of loops, local switching, and transport, is an element-dependent entry strategy that

relies heavily on ILEC elements. In some cases, however, the UNE-P CLECs integrate their own technology into the platform to customize the service.[38] In fact, with the exception of total service resale, virtually all EDEs integrate some type of facilities with the ILEC network. Thus, while EDE's may not be new "network" facilities-based entrants, they nonetheless should be considered to be "facilities-based" entrants.

A problem faced by all EDEs is the ILECs' incentive to impede new entry, and examples of these incentives in action are readily available.[39] Additionally,

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[38] For example, Z-Tel Communications integrates a variety of call control features, Internet functionality, and voicemail with the UNE-Platform.

[39] *See, e.g.*, Yuki Noguchi, *CLECs Blame Bells, Bells Blame Hookups, Some Blame Agencies* WASHINGTON POST (December 16, 2000) Page E1; Peter S. Goodman, *FCC Chief Stresses Phone Competition*, WASHINGTON POST (May 8, 2001) Page E1. Indeed, the incumbents are keeping the FCC's Enforcement Bureau busier than ever. For example:

- As recently as September 14, 2001 (DA 01-2079), the FCC's Enforcement Bureau of the Federal Communications Commission (FCC) announced that it entered into a Consent Decree with Verizon Communications, Inc. (Verizon), under which Verizon will make a "voluntary payment" of $77,000 to the United States Treasury and will take certain remedial actions regarding its collocation practices.
- On May 29, 2001, the FCC affirmed its Enforcement Bureau the $88,000 fine imposed by the Commission's Enforcement Bureau in March 2001 against SBC Communications, Inc. (FCC 01-184) for violating reporting requirements that the Commission imposed pursuant to its approval of the merger application of SBC and Ameritech Corp.
- Similarly, on January 18, 2001, the FCC sought to fine SBC Communications, Inc. (SBC) $94,500 (DA 01-128) after an independent audit discovered that SBC failed to comply with the FCC's rules that require incumbent telephone companies to allow competing telephone companies to place equipment in the incumbents' offices – in particular, that SBC failed to promptly post notices of all incumbent owned sites that have run out of collocation space such that competitors do not waste time and resources applying for collocation space where none exists.
- On November 2, 2000, the Federal Communications Commission settled with BellSouth Corporation (FCC 00-389) to have them make a "voluntary payment" of $750,000 to the United States Treasury and to take important steps to improve its compliance with FCC rules relating to the negotiation of interconnection agreements between competing carriers. Indeed, the FCC's investigation disclosed that, for more than six months in 1999, BellSouth failed to provide a competitor with cost data to support BellSouth's proposed prices for unbundled copper loops, despite the competitor's written request for such data. And, in addition to the $750,000 voluntary payment, the Consent Decree obligates BellSouth to adopt procedures for expedited access to confidential information (including issuance of a standard non-disclosure agreement that complies with the relevant FCC rules) and to adopt procedures for competitors to elevate disputes regarding disclosure of

(Footnote Continued. . . .)

EDEs are subject somewhat to the whims of regulation. Past and potential regulatory failures, and the frequent capture of regulatory agencies by the ILECs, make element dependent entry a somewhat risky endeavor. Those risks, however, are at least partially offset by the reduction in risk provided by the reduction in sunk cost investments. Because regulators can impact substantially the financial condition of EDEs, regulatory costs for EDEs can be substantial.[40]

Opportunities for "sabotage" of EDEs by regulators are always at hand. The FCC, for example, has shown a willingness to remove elements from the list of unbundled elements for less than compelling reasons. For example, the FCC does not require that the ILEC provide unbundled local switching to CLECs whose customers have more than three access lines and are located within the densest markets. The basis for the FCC's switching exclusions was that a few CLECs had deployed switching equipment in some dense markets.[41] Notably, many of these switches were deployed by now-bankrupt CLECs, and much of that switching capacity was not designed for the port-side services that substitute for unbundled switching. The switching exclusion is currently being reconsidered at the FCC, however. Further, the FCC is considering presently an effort by the ILECs to eliminate high capacity circuits from the list of unbundled elements. Generally, high capacity unbundled loops can be more than half as costly as equivalent special access service purchased out of ILEC retail tariffs. Thus, the ILECs' desire to remove high capacity circuits from the list of unbundled elements is apparent. And, the FCC's review of Section 271 applications to permit ILECs to vertically re-integrate and to provide in-region

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confidential information to higher levels within BellSouth. In addition, BellSouth will provide training to its negotiators concerning the relevant statutory and regulatory requirements, as well as BellSouth's revised procedures.

[40] Despite the problems with element dependent entry, the EDE entry strategy is today the most effective at providing consumer choice in local telecommunications. In fact, those EDEs with the greatest reliance on the ILEC are most successful in acquiring market share. Element dependent strategies such as UNE-P allow for the rapid accumulation of market share without the need to sink costs in the network. The relative success of EDEs, particularly UNE-P CLECs, perhaps has reduced regulatory risks. In the regulatory arena, a customer base is a constituency, and UNE-P CLECs may have acquired sufficient market share to discourage regulatory sabotage of that particular entry strategy.

[41] Local Competition Provisions of the Telecommunications Act of 1996, UNE Remand Order, 15 FCC Rcd 3696, (1999).

inter-LATA service appears now to be little more than a formality, with approval a near guarantee.[42]

While excluding particular elements from the list of unbundled elements certainly interferes with their purchase, high prices for elements can be an equally effective deterrent to entry. Important to the purchase of the ILECs' elements is that the price of these elements supposedly is set equal to total element long run incremental costs (*a.k.a.,* TELRIC). ILECs strongly oppose TELRIC pricing, and the pricing standard has been challenged in court since its conception in the FCC's First Report and Order implementing Section 251 of the 1996 Telecoms Act.[43] Generally, the ILECs oppose TELRIC pricing because the prices for elements are confiscatory (*i.e.*, are "too low" or "below costs") and therefore somehow results in an unlawful "takings."

Some industry pundits, particularly those sympathetic to ILEC positions, believe that TELRIC pricing will be phased out, and that eventually element prices will be based more on historical or opportunity costs than on forward-looking costs. There is little evidence from either the FCC or state regulatory commissions that TELRIC will be abandoned. Nevertheless, the risk of dramatic changes in elements rates (perhaps due to changes in pricing standard) cannot be trivialized. Today, element rates are determined by regulatory fiat, and regulators can be fickle. Element-rate sabotage is a constant, though perhaps weak, threat.

Moreover, those CLECs with a heavy dependence on ILEC facilities are required to sink significant other entry costs as well (see Table 1). For example, the sunk costs of systems and customer acquisition are not small. Nevertheless, the sunk costs of an element-dependent entry strategy are much less than that of

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[42] See Naftel & Spiwak, *supra* n. 37 at 226-231.

[43] *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, First Report and Order, CC Docket No. 96-98, 11 FCC Rcd 15499, 15782-807, (1996) (*Local Competition Order*), *aff'd in part and vacated in part sub nom. Competitive Telecommunications Ass'n v. FCC*, 117 F.3d 1068 (8th Cir. 1997) & *Iowa Util. Bd. v. FCC*, 120 F.3d 753 (8th Cir. 1997), *aff'd in part, rev'd in part, and remanded sub nom. AT&T Corp. v. Iowa Util. Bd.*, 525 U.S. 366 (1999) (*AT&T v. Iowa Util. Bd.*), *aff'd in part and vacated in part on remand*, *Iowa Util. Bd. v. FCC*, 219 F.3d 744 (8th Cir. 2000), *cert. granted sub nom. Verizon Communications Corp. v. FCC*, 121 S.Ct. 877 (2001), *Order on Reconsideration*, 11 FCC Rcd 13042 (1996) (*Local Competition First Reconsideration Order*), *Second Order on Reconsideration*, 11 FCC Rcd 19738 (1996) (*Local Competition Second Reconsideration Order*), *Third Order on Reconsideration and Further Notice of Proposed Rulemaking*, 12 FCC Rcd 12460 (1997) (*Local Competition Third Reconsideration Order*), *further recon. pending.*

a networked-based entry strategy. Network facilities can be a severe drain on an entrant's resources and they substantially raise the risk of entry. Further, the speed with which customers can be acquired may not allow the entrant to exhaust the inherent scale economies in telecommunications plant.

Despite these risks of investing in telecommunications plant, some EDEs have duplicated major components of the ILECs' network to provision services. For example, switch-based CLECs typically acquire loop facilities from the ILEC, but cross-connect those loops over to their colocation equipment and switch. DSL providers, similarly, cross-connect loop plant over to their colocation. While this hybrid element-facilities approach reduces reliance on the ILEC, substantial sunk costs are nonetheless required.

The "smart–build" approach, where facilities are deployed in a highly controlled and meticulous fashion, has met with some success. Nevertheless, the heavy burden of facilities deployment and the slow, arduous customer acquisition process has sent many CLECs to the grave.[44] *Further, while the light use of ILEC facilities reduces reliance on the reluctant supplier, the ability of the ILECs' to disrupt CLECs' business plans is not removed.* Indeed, in some cases, those CLECs deploying their own plant to complement the ILECs' elements require even more ILEC intervention to provision service (*e.g.*, the manual hot-cut process) than the more pure EDEs.

These hybrid entrants – *i.e.*, those using both ILEC elements and their own facilities – represent the bulk of CLEC bankruptcies over the past year or so. This group consists primarily of those providers adopting the "built it and they will come" business plan. Not all of the hybrids will fail, however. Allegiance Communications, for example, expects to be profitable soon. A review of their financials indicates that their expectations are not unrealistic.[45] On the other hand, other CLECs, with hundreds of millions in debt and slow revenue growth, probably never had a chance. DSL provider Northpoint, for example, carried about half a billion in debt, $24 million in quarterly revenues growing at 10%

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[44] A recent New York Times article illustrates this fact, noting that during the year 2001 the number of CLECs has declined from over 200 to about 75. *See* Eve Tahmincioglu, *A Phone Upstart, Still Annoying the Giants*, NEW YORK TIMES (November 4, 2001).

[45] Allegiance Telecom shows revenue growth of about 20% per quarter, costs growth of 12% per quarter, and stable long-term debt (growing at about 3% per quarter). Maintaining these growth rates on current levels of revenue, costs, and debt indicate the Allegiance will be "profitable" in about 5 years.

quarterly, and just over $100 million in quarterly costs (cost of goods sold and Sales, General & Administrative costs) growing at 20% quarterly. As such, Northpoint, and similarly situated CLECs, were doomed from the outset.

While hope remains for a few of the hybrid entrants, the impact of the hybrid entrant on competition unfortunately will be *de minimis*. For example, switch-based CLECs face a severe constraint on migrating customers to their network – the highly manual hot-cut process. Every customer a switch-based CLEC acquires must be hot-cut over to the CLEC's collocation equipment.

Consider the effect of hot-cuts on competition in New York. In New York, about 6,000 hot-cuts are performed each month.[46] Assuming a 4% monthly churn rate, the number of access lines that CLECs can service (at existing hot-cut rates) in New York in a period of three years is about 115,000 lines (including the effect of churn). According to FCC ARMIS data, there are about 12 million access lines in New York, and this figure is growing at about 0.25% per month (over the past five years). After three years of hot-cuts, roughly 0.9% (nine tenths of one percent) of the total New York market could be served by switch-based CLECs. Even with no churn, the percent of customers that switch-based CLECs could service is only 1.6%.

As a point of reference, in December 2000, about 254,000 UNE-Platform lines were provisioned to CLECs. In other words, UNE-Platform can produce a level of competition in a single month that switch-based CLECs cannot exceed even after three years (even with zero churn). In fact, UNE-P can provide service to nearly ten times as many customers in six months than could switch-based CLECs after 10 years of hot-cuts (assuming current hot-cut levels). As discussed *supra*, the rapid migration of customers to EDEs is important for the future of network-based competition.

B. *Network-Based Entrants or "NBEs"– the "Builders"*

While we divide entrants into EDEs and NBEs, it is generally the case that all CLECs use the incumbent's network to some degree. By NBE, we mean carriers

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[46] This estimate is based on December 2000 and February 2001 data where Verizon performed 6,878 and 4,137 hot-cuts (Letter to Honorable Janet H. Deixler, Secretary, New York Public Service Commission, Cases 97-C-0271and 99-C-0949, March 26, 2001). While the 6,000 hot-cuts is an observed level of demand, hot-cuts do have a physical capacity constraint that is far less than that for UNE-P, because UNE-P migration, in most cases, does not require manual intervention.

that rely more heavily on their own facilities, using the dominant incumbent's network only in special circumstances. CLECs in this group include Time Warner Telecom, XO Communications, RCN, and bankrupt firms such as Teligent and Winstar.[47] NBEs generally target medium-large and large businesses, and possibly residential multiple dwelling units in metropolitan markets.

The sunk costs and economies of scale endemic in the local exchange market were discussed previously. Sunk costs raise the risk of entry, and the economies of scale associated with fixed/sunk costs require large market shares to attain profitability. The CLEC industry today is well aware of the difficulty of achieving scale economies and doing so relatively quickly.

The capital required of the NBE is substantial. As shown in Table 1, entry costs for XO Communications exceed $11 billion. Despite these large entry costs, of which about a third is in plant, the addressable market of XO Communications is relatively small. RCN Communications, whose network construction is limited to the most densely populated areas, has entry costs of nearly $6 billion for a total addressable market of about 1.5 million households (about 1.3% of U.S. households). Access to this kind of capital by a large number of CLECs is unlikely.

Moreover, just as with the EDEs, the regulatory risks for NBEs are far from trivial. Permits and other government approval costs, again mostly sunk in nature, average about 10% of total project costs.[48] These upfront investments in lengthy regulatory efforts substantially increase risk, given that these costs are incurred prior to even receiving permission to construct. In some cases, permission is not granted or is too costly, and these projects are consequently aborted.

While it seems that network-based entry would eliminate the prospects for ILEC strategic, anticompetitive behavior, even network-based entrants run into trouble with the incumbents. As one NBE observed:

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[47] *C.f.,* Richard Walters, *Crunch Time for the US Telecoms Industry,* FINANCIAL TIMES (30 April 2001).

[48] Sweeney, *supra* n. 13 at p. 10.

> When you go to the incumbents, the inventory of conduit always seems to be shrinking. They want you to go out and dig up the street and run up your own costs.[49]

Thus, even those entrants that are network-based in nearly every respect must interact with the ILEC. Moreover, the omnipresent regulatory risk in telecommunications even impacts the NBEs:

> We're in a legal struggle right now where [the incumbent is] trying to say that we don't meet the definition of a CLEC because we're a "carriers'-carrier." They don't want to unbundle anything.[50]

Accordingly, it appears that even dividing up entrants as element-dependent or networked-based is problematic. Every entrant must deal with the incumbent and is a potential victim of sabotage; it is just a matter of degree.

**IV. The Model**

The review of current entry strategies reveals two common themes. First, *the dominant, vertically-integrated incumbent firm has powerful incentives to hinder, if not completely put out of action, those CLECs relying on its unbundled elements to provide service*. When an ILEC sells an unbundled loop to a CLEC in the wholesale market, that loop will almost certainly be used to serve a current customer of the ILEC in the retail market. If service provision is mutually exclusive, then the ILEC will lose that customer and the monthly margin associated with that customer. If the regulated price for elements does not compensate the ILEC fully for its cost and lost margin, then the ILEC is incented to sabotage the transaction. Second, *entry into the local exchange market by a large number of providers likely will require access to unbundled elements supplied by either the ILEC or a CLEC*.

These basic ideas, mixed with the influence of scale economies and regulation, serves as the foundation for the economic model of incentives presented in this section. While the presentation of the model is greatly simplified for consumption by a broad audience, the model is technical by its very nature. Numerical examples are provided at the end of the section for those wanting to avoid the more technical presentation.

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49 *Id.* at p. 9.

50 *Id.* at p. 9.

A. *Primary Assumptions of the Model*

All analyses are based on a particular set of assumptions, and this analysis is no exception. The assumptions chosen here simplify the analysis, while capturing the salient features of the telecommunications markets under investigation. The assumptions used in the model here include the following:

(a) There is a large, integrated (wholesale and retail) incumbent (*e.g.*, the ILEC) that is legally obligated to sell unbundled network elements to retail competitors at regulated prices;

(b) These incumbents may, however, "sabotage" this process through non-price means;

(c) There exists scale (or density) economies in network (wholesale) operations, and these economies may be substantial;

(d) While there may exist scale economies in retail operations, these economies are smaller than those in wholesale operations; and

(e) Wholesale services/elements are required to provide retail services, on a "one for one" basis.

To simplify the model exposition, we introduce the following notation:

$MS_j$ retail market share of firm $j$.
- $j = 1$ dominant firm
- $j = i$ other integrated firms
- $j$ = a, b, c, … stand-alone, non-dominant retail firms

$S_k$ wholesale market share of firm $k$
- $k = 1$ dominant firm
- $k = i$ other integrated firms
- $k = w$ stand-alone, non-dominant retail firms

$\gamma$ typical retail margin (revenues less retail costs and element costs)

$C(S)$ cost of network of "size" $S_j$, with $C' > 0$ and $C'' \leq 0$[51]

$\check{r}$ regulated price of "network elements"

$z$ non-price costs imposed on CLEC buying an element form the ILEC

$r_i$ unregulated price of "network element" sold by integrated, non-dominant firms

$r_w$ unregulated price of "network element" sold by stand-alone wholesale firm.

The following additional "empirical generalizations" are used in what follows: (a) the incumbent, integrated firm does not wish to sell elements to competitors at price $\check{r}$; and (b) margins and prices are such that retail competition is viable if retail competitors are able to obtain elements at the long run average costs of an efficient competitor. The first generalization implies that the regulated rate for the element is below the opportunity cost of the element for the dominant incumbent, whereas the second generalization ensures that competition is viable and thus a reasonable expectation and policy goal.

B. *The Cost of Selling Elements*

The next step in the analysis is to characterize the opportunity costs of selling elements by integrated and unintegrated firms. Consider an integrated firm with network "market share" $S$ and retail market share $MS$. The marginal opportunity cost of transferring control of one element to a competitor, $t$, is then

$$t = C'(S) + MS \cdot \gamma . \quad (2)$$

where the first term, $C'(S)$, represents the ordinary marginal cost of an element given a network of "size" $S$.[52] The second term, $MS \cdot \gamma$, illustrates the potential

[51] The notation $C'(S)$ indicates marginal cost, where marginal cost is the first derivative of the cost function with respect to the quantity of element produced. The second derivative of the cost function is $C''(S)$. These assumptions merely imply that producing elements is costly ($C'(S) > 0$), but that there are scale economies in this process ($C''(S) \leq 0$).

[52] The Efficient Component Pricing Rule (ECPR) calls for a price equal to $t$. TELRIC pricing is roughly equivalent to average cost pricing, or price is equal to $C(S)/S$.

impact of the sale on the retail portion of the seller's operations. Given a retail market share of *MS*, the (naïve) probability that the sale of the element results in a lost retail account is *MS*. *In other words, if the seller has 50% of the market, then there is a 50% chance that the purchaser of the element is then using that element to serve an existing customer of the seller.* Since a typical account produces a margin of γ, the expected lost retail margin on the sale is $MS \cdot \gamma$, and the total cost of the element transfer is therefore $C'(S) + MS \cdot \gamma$ – the marginal cost plus the lost retail margin of the element.[53]

Two important points arise here. First, a seller with a larger network (*i.e.*, *S* is larger) enjoys a lower marginal cost; if $S_{k1} > S_{k2}$, then $C'(S_{k1}) < C'(S_{k2})$. In other words, there are economies of scale. Second, a seller with a larger retail operation faces a higher opportunity cost (*t*), since the sale of an element to a competitor is more likely to result in a lost retail account. The relationships between the opportunity cost $C'(S) + MS \cdot \gamma$ and the shares *S* and *MS* are illustrated in Figure 1.

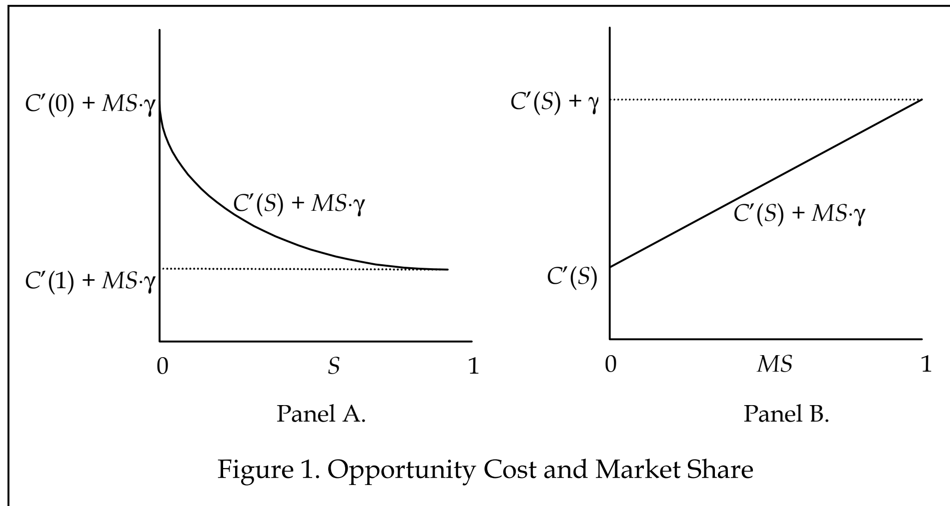


Figure 1. Opportunity Cost and Market Share

The relationship between wholesale market share and opportunity costs is illustrated in Panel A. For a given market share and retail margin, opportunity

53 We assume, for simplicity, that the retail margin γ is not affected by the sale of one element.

costs are declining in wholesale market share. This relationship also implies that marginal cost, $C'(S)$, is declining in wholesale market share (*i.e.,* there are economies of scale). Panel B illustrates the relationship between retail market share and opportunity costs. With marginal production cost constant, the larger the market share of the firm, the larger the opportunity cost. This relationship, because marginal production costs are constant, is based on the (expected) relationship between the forgone retail margin and the sale of an element.

Because a wholesale-only firm has no retail market share, the opportunity cost of providing an element for a wholesale-only firm is just $C'(S)$. Given the existence of scale economies, a price of $C'(S)$ is not consistent with long-term financial success. Scale economies imply that marginal cost lies below average cost, so that a price equal to marginal cost does not fully recover the total cost of the firm. Long-run average cost, $C(S)/S$, is the minimum price consistent with viability of a wholesale-only seller.[54]

C. *The Price of Elements*

The next step in the model is to analyze the conditions under which element sales can be made. Figure 2 illustrates the opportunity cost to the dominant firm from selling one or a few elements, and the regulated level of remuneration they obtain from such sales ($\check{r}$).

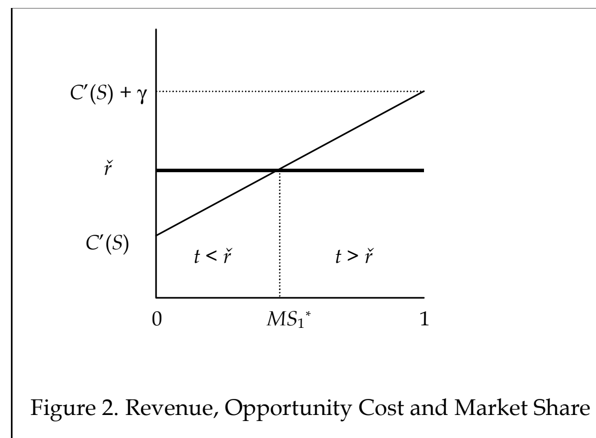


Figure 2. Revenue, Opportunity Cost and Market Share

[54] Note that $C(S)/S$ is the functional equivalent of Total Element Long Run Increment Cost (TELRIC).

The model assumes on this diagram that $\check{r}$ is sufficiently high that $\check{r} \geq C'(S_1)$, i.e., $\check{r}$ exceeds the long-run incremental cost of the dominant firm. This is not the same as assuming $\check{r}$ is remunerative, however, since scale economies are present. However, the analyses to follow do not depend on this relationship.

Inspection of Figure 2 illustrates an important fact: the dominant incumbent is willing to sell an element at price of $\check{r}$ only if $MS_1 < MS_1^*$ (where $t < \check{r}$). At all higher market shares, the opportunity cost ($t$) exceeds $\check{r}$ and the incumbent is unwilling to sell elements, and this unwillingness to sell elements is driven by the lost retail margin of the dominant incumbent (*i.e.,* $MS \cdot \gamma$). The conclusion is strengthened if $\gamma$ falls as element sales are made because the seller is marginalizing (the elements reduce the margin on all units sold in the retail operation of the seller).[55] Thus, if element sales increase price competition in the retail market, then the incumbent's incentive to sell elements in the wholesale market is diminished. For simplicity, this model considers the sale of a single element with, presumably, negligible effects on retail margins. Nevertheless, the impact of price competition on the incumbent's incentives is noteworthy.

D. *Sabotage*

As noted *supra*, "sabotage," as used in this Policy Paper, has a very specific definition – that is, the ability of a dominant firm to raise the cost of a rival's key input of production by non-price behavior. While sabotage can occur in a variety of contexts, the inherent tension created by the wholesale supplier/retail competitor conflict – especially when the wholesale price is regulated – provides fertile ground for abuse.

That is to say, the dominant, integrated firm is regulated and is legally required to sell elements at price $\check{r}$. Here, however, experience highlights the substantial gulf between the requirements of the 1996 Act and reality. Suppose that the regulated, dominant firm can impose non-price costs of $z$, $z \geq 0$, per element on buyers, although they will earn no revenue by this action (*i.e.,* $z$ is a

[55] Lower retail margins reduce opportunity costs and thus encourage element sales. However, the seller will not purposefully reduce its retail margin through the sale of elements to reduce its opportunity costs.

cost to buyers but not a revenue to the seller).[56] Given this possibility, what level, if any, would the dominant firm choose to sell?

It is clear that, when $MS_1 < MS_1^*$ the dominant incumbent does not want to sell elements. Thus, in this situation, $z$ will be set at its maximum feasible value to impede the sale of elements. Because the sale of a single element is undesirable, the sale of more than one element is also undesirable because a larger quantity of elements sold is more likely to reduce (or merely not increase) $\gamma$, the retail margin.[57] Cost-based prices do not, and should not, incorporate such margins. Thus, cost-based prices are set below the opportunity cost of the incumbent. *Consequently, to the extent that the incumbent dominant firm is able to impose costs on rivals, its incentives are to do so.*[58]

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[56] As noted *supra*, the concept of "sabotage" is explored in great technical length in T. R. Beard, D. Kaserman, and J. Mayo, *Regulation, Vertical Integration, and "Sabotage"*, forthcoming in the JOURNAL OF INDUSTRIAL ECONOMICS (Fall 2001).

[57] The model shows that the dominant incumbent will not sell one element. This specification of the model is for convenience, but the same result holds for larger quantities of elements sold.

[58] A similar situation can be observed in the market for multi-channel delivered video programming. There, both the upstream (programming) and downstream (distribution) markets are also characterized by high sunk costs and the necessity of achieving scale economies. For this reason, many cable multiple system operators ("MSOs") sought to mitigate their risks by vertically integrating with popular cable networks. As access to these popular cable networks way key to a competitor's ability – such as satellite providers or cable over-builders – to succeed in the market, these vertically-integrated cable MSOs had a strong incentive to (and did) engage in strategic anticompetitive conduct against their rivals. In order to stop such anticompetitive conduct, therefore, Congress was forced to promulgate the Program Access rules in the 1992 Cable Act to require vertically-integrated MSOs who deliver programming over satellite to demonstrate why their exclusive distribution programming contracts were in the public interest. For a full exegesis of the Program Access paradigm, *see* James W. Olson and Lawrence J. Spiwak, *Can Short-Term Limits on Strategic Vertical Restraints Improve Long-Term Cable Industry Market Performance?*, 13 CARDOZO ARTS & ENT. L.J. 283 (1995) (http://www.phoenix-center.org/library/prog_access.doc); *see also* George S. Ford and John D. Jackson, *Vertical Integration and Horizontal Concentration in the Cable Television Industry*, REVIEW OF INDUSTRIAL ORGANIZATION, Vol. 12, Issue 4, 501-18 (August 1997). (Ironically, it was Representative – and now Chairman of the House Committee on Energy and Commerce – "Billy" Tauzin who sponsored this important pro-competitive legislation for the cable industry but who now vociferously rejects the same logic in the telephone industry.)

E. *Sales by a Vertically-Integrated Non-Dominant CLEC Provider*

What, though, of element sales by a non-dominant vertically-integrated CLEC provider? The above analysis can be extended beyond the dominant incumbent to any integrated seller (including CLECs). An integrated seller is willing to sell an element at any price $r$ only if their market share is less than a critical value determined by $C'(S_i)$, $\gamma_i$, and $MS_i$. For example, an integrated but non-dominant seller would sell an element at price $r$ only if $r > C'(S_i) + MS_i \cdot \gamma$. Of course, such a price may not be remunerative with substantial scale economies at $S_i$, but this relationship serves as a lower bound. Note that the value of $C'(S_i)$ may be quite high when $S_i$ is small, as are many CLECs, due to scale economies in network elements.

Competition, to the extent that it exists among sellers of elements, may impose a maximum price any given integrated seller can charge for an element. If so, call that price $r_{\max}$. Given $S_i$, $\gamma$, and $MS_i$, we may well have $MS_i > MS_i^*$ for $r_{\max}$, implying no sales of elements by larger integrated, unregulated firms because the large retail market share increases the opportunity costs of such sales. This "no sales of elements" strategy is more likely the larger the retail operations of the firm ($MS_i$), the larger the retail margin ($\gamma$), and the smaller the wholesale operations of the firm ($S_i$). Importantly, the non-dominant supplier's wholesale rates are unregulated, so there is no incentive for strategic, non-price anticompetitive behavior. The non-dominant wholesale firm responds to its incentives by adjusting price.

Clearly then, the presence of scale economies also affects the behavior of vertically-integrated CLECs as well, but in what way? The model indicates that while a vertically-integrated CLEC may not opt for a separate wholesale business strategy (in addition to its retail operations), the CLEC will not go out of its way to actively frustrate entry as the ILEC would. That is to say, as noted *supra*, sabotage is the result of regulated prices for elements that are below the opportunity cost (but not necessarily the average cost) of the incumbent. Yet, because the price for elements is not prescribed for unregulated sellers (CLECs), these firms have no incentive to sabotage transactions. However, as also noted above, the higher the opportunity cost of the unregulated firm, the higher is $r_i$ – the price at which the unregulated firm will sell elements. The element price $r_i$ is decreasing in $S$, and increasing in $MS_i$ and $\gamma$. *Accordingly, a fully-integrated non-dominant CLEC provider with a significant market share in the retail market will not affirmatively seek to thwart entry. Instead, this CLEC will simply offer elements to the wholesale market at "high" prices. As a result, while an EDE may be able to purchase some elements from a CLEC for short-term purposes, purchasing elements from the ILEC is always fraught with peril.*

F. *Summary of Model with a Numerical Example*

Although of a fairly technical nature, the model described here merely formalizes a fairly simple and common-sense notion: *whenever an integrated firm sells a network element, or network services, to a retail competitor, there is a chance that that sale will cause the integrated firm to lose a customer to the buyer.* In a sense, such sales to retail competitors involve the risk of also "selling" a valued customer, and the integrated firm will recognize this fact in its actions towards those seeking wholesale services. Further, the risk of such a loss to the seller is related directly to the seller's market share in the relevant market. For example, a firm with a virtual monopoly in the retail market will almost surely lose a customer if it supplies a retail competitor with the ability to offer further retail services. There is, after all, almost nowhere else from which such a customer could come.

The reluctance of integrated sellers to sell elements or wholesale services can be measured by the prices they would require in order to be induced to voluntarily sell such elements to competitors. Further, however, in order for elements to be sold by an integrated firm, the price charged must also be below the potential earnings of the buyer, so that the sale is economic for the retail firm. The analysis presented here allows this requirement to be analyzed and understood using simple numerical examples.

Suppose, to make it concrete, that, in some given market, the economic cost of the necessary element [$C'(S)$ in the model] is $15 per month for a firm with a 50% market share in the wholesale market. Suppose further that, given the additional costs arising from retailing, an efficient retail service supplier could expect to earn a margin of $25 per month ($\gamma$ in the model), not counting the costs of the wholesale element. This implies that, given an element of cost $15, a customer in hand is worth $10 (= $25 - $15). Then, the prices in Column 2 of Table 2 ($r_{min}$ in the model) would be required by the integrated seller in order to induce them to sell the element, with these figures related to the integrated firm's market share in the relevant market.

**Table 2. Minimum Element Prices**

| Retail Market Share ($MS$) | Minimum Element Price ($r_{min}$) |
|---|---|
| 0% | 15.00 |
| 25% | 17.50 |
| 50% | 20.00 |
| 75% | 22.50 |
| 100% | 25.00 |

Although a very simple example, these calculations show that the willingness of an integrated seller to provide a wholesale service to a retail competitor is directly and positively related to the retail market share of the integrated firm. Since a potential competitive retailer that might seek to buy elements is likely to be operating on lower margins than the existing dominant firm, element prices of the sort illustrated here can be expected to substantially reduce the sales of elements and the emergence of competition at the retail stage.

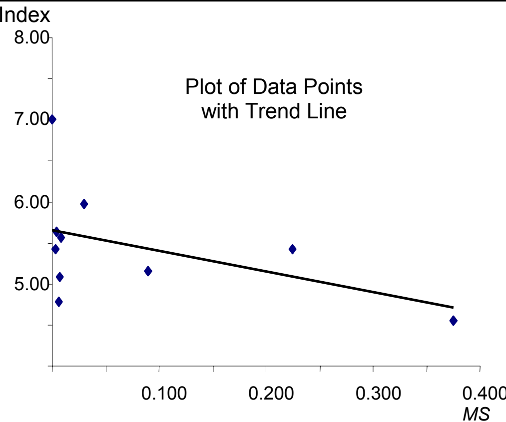
G. *Market Examples*

Because there are no integrated, non-dominant CLEC suppliers of local exchange elements, comparable examples must be found elsewhere. As an analogy, consider the wholesale market for long-distance services, where the "element" in this context is access to a nationwide long-distance network. In the long-distance market, the retail market share variable *MS* is properly characterized as the underlying carrier's national market share; the long-distance market is national in scope. Any customer of an integrated interexchange carrier is potential prey for a retail carrier using the facilities of the integrated firm. Assuming $\gamma$ is equal across firms and scale economies are exhausted for all national long-distance networks, the expectation is that the price charged by interexchange carriers with large retail market shares would be higher than those without such shares.

Table 3 provides an analysis of customer perceptions of a representative sampling of wholesale carrier price points and the respective carriers' retail market share. The model suggests that AT&T, the largest retail provider of long-distance service, would have the highest prices for wholesale capacity. Table 3 indicates that customers and potential customers of AT&T wholesale capacity view AT&T's prices as relatively high, with AT&T having the lowest rating for pricing (4.26). Further, those carriers with the smallest retail market shares are given the highest rating for pricing (7.00). While the data presented in Table 3 are not perfectly comparable to the analysis above (the market share data are not perfectly analogous and there are other factors that influence price), the general relationship is compatible with expectations. Furthermore, while AT&T has the largest network and largest retail market share, MCI-WCOM is the largest wholesale carrier. It appears that AT&T's retail market share continues to influence the company in the long-distance wholesale market.

**Table 3. Pricing Satisfaction and Market Share of Interexchange Carriers**

| Carrier | Pricing Satisfaction Index* | Market Share |
|---|---|---|
| AT&T | 4.56 | 0.376 |
| Cable & Wireless | 5.08 | 0.008 |
| Global Crossing | 5.57 | 0.008 |
| Broadwing | 4.79 | 0.006 |
| MCI Worldcom | 5.42 | 0.225 |
| Qwest | 5.98 | 0.030 |
| Sprint | 5.15 | 0.090 |
| Teleglobe | 5.42 | 0.003 |
| Williams | 5.63 | 0.004 |
| Misc. Small Carriers | 7.00 | … |
| Mean | 5.49 | |




* Higher values indicate lower prices.
Source: Resellers Rate Wholesale Carriers, Phone +, September 4, 2000; Trends in Telephone Service, Federal Communications Commission, August 2001 (Data for year 2000), at Table 10.1

In stark contrast to the highly competitive market for wholesale capacity in long-distance services, the wholesale market for the U.S. wireless industry is immature. The opportunity cost model sheds some light on this fact. Historically, the margins ($\gamma$) for wireless service have been quite high. Further, the wireless carriers have only recently begun to exhaust scale economies, suggesting $C'(S)$ was large historically. Today, market shares have somewhat stabilized, allowing wireless carriers to better assess their opportunity costs. With wireless margins lower, market shares stable and disparate, and scale economies near exhaustion for some carriers but not for others, the model presented above suggests that a wholesale market in wireless telecommunications may emerge.

In fact, notwithstanding the U.S. situation, the formation of such a wholesale wireless market is nonetheless well underway in the rest of the world. These self-described "mobile virtual network operators" or "MVNOs" such as Virgin Mobile, Sense Communications and the Financial Times Group – *i.e.*, firms that are essentially "marketing machines"[59] – are all making significant headway in numerous markets in Europe, Asia and Australia.[60] Not surprising, therefore,

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[59] *See, e.g.*, *Branson to use Virgin Airline as Mobile Weapon*, REUTERS (03 September 2001).

[60] *See, e.g.*, *Telecom NZ's AAPT Looks for Australia MVNO Deals*, TOTAL TELECOM (17 September 2001); *Virgin plans US$550m Asian Spend, Sees HK Partner Soon*, TOTAL TELECOM (12 June 2001) (U.K.-based Virgin Group plans to spend (US) $550 million on expanding its mobile virtual (Footnote Continued. . . .)

recent trade press reports reveal that several U.S. wireless carriers are warming up to the idea of offering their capacity as a wholesale supplier as well.[61]

## V. Implications of the Model and the Case for an ADCo

### A. *Emerging Trends*

The analysis above indicates that the opportunity cost of selling elements rises as wholesale market share declines and as retail market share increases (holding the retail margin constant), suggesting the following possible conclusions. First, there is reason to believe that *no integrated firm with large retail presence will emerge as an efficient, cost-based supplier of network elements to retail competitors. Moreover, the regulated, dominant firm, and any larger integrated firm, may well be reluctant to create their own competition through element sales.* For both dominant and non-dominant providers, there exists a clash between scale economies on the one hand and retail market share on the other. Size does matter, so to speak, but in conflicting ways. For an integrated provider offering no elements to the wholesale market, wholesale ($S$) and retail market share ($MS$) are highly correlated. The opportunity cost of selling elements declines as wholesale market share increases; the opportunity cost of selling elements increases as retail market share increases. *Thus, it is quite possible that the lowest cost providers (those exhausting economies of scale) do not participate in the wholesale market, particularly at better prices, because of a high retail market share.*

Second, the presence of scale economies suggests that small wholesale firms, or retailer self-supply, may likewise be non-economic. *Realizing economies of scale*

network operations in 10 Asian regions over the next three to five years according to Ross Cormack, chief executive of Virgin Mobile (Asia)); Ray Le Maistre, *Operators: MVNOs - Not All Virgins*, ROAM (04 June 2001); George Malim, *COR Boosts the Power of Smaller MVNOs*, TOTAL TELECOM (21 May 2001); Annie Turner, *Mobile Virtual Network Operators: Taking Root*, NEW CARRIER (30 April 2001); Anne Young, *FT and The Carphone Warehouse Form MVNO Deal with Cellnet* TOTAL TELECOM (05 March 2001); Joanne Taaffe, *Feature: Mobile Virtual Network Operators - Marking Out Their Territory,* COMMUNICATIONS WEEK INTERNATIONAL (05 March 2001); Anne Young, *MVNOs: a Market Essential or an Operator's Bete Noire?* TOTAL TELECOM (22 February 2001); Gerard O'Dwyer, *Norwegian MVNO Sees Sense in Nordic Expansion,* TOTAL TELECOM (06 February 2001); Emma McClune, *3G Owners Awash with Virtual Partner Offers,* COMMUNICATIONS WEEK INTERNATIONAL (15 January 2001).

[61] *See, e.g.,* Bruce Christian, *Wanted: Channels for Wireless Wholesalers Look to Resellers for Distribution Help*, PHONE+ (March 2001); *Virgin Teams Up With Sprint to Hit U.S.,* REUTERS (05 October 2001).

*affects profitability; thus exhausting scale economies is desirable. However, doing so may be difficult if wholesale market share is tied directly to retail market share.* An integrated firm may be unable to acquire sufficient retail share to exhaust scale economies at the wholesale level. The retail market share of the firm, however, may impede the firm's ability to increase wholesale sales to achieve scale economies by raising the opportunity cost of element sales. Thus, numerous forces operate against the prospect of wholesale supply by integrated firms, whether dominant or non-dominant.

Similarly, *a large retail market share indicates that the incumbent will have a significant incentive to sabotage and discriminate against rivals in the wholesale market.* Further, *the scale economies in the local market are more significant than in long-haul networks and therefore it is unclear whether individual EDEs will ever acquire sufficient market share to justify the construction of network for their exclusive use*. As such, *for those firms that rely heavily, if not exclusively, on the incumbent to provide wholesale elements at just and reasonable rates, the economics do not bode well for long-term viability.*

What, then, is the alternative? The analysis presented here illustrates a potential solution to this dilemma: the wholesale-only firm or "ADCo." Such a firm can offer retail entrants the immediate advantages of larger scale – thus obtaining scale economies in network operation – without the retail-market-share-driven disincentives to wholesale supply. In addition, given the wholesale nature of the ADCo and advances in technology, retail entrants can use the ADCo's facilities – *i.e.*, essentially a "dumb pipe" – to provide customers with custom-tailored products and services that the incumbents' network simply is unwilling or unable to provide (*e.g.*, managed IP services). Accordingly, while the number of local access networks the market can sustain may be *few*, the wholesale nature of the ADCo nonetheless permits the number of providers of advanced telecoms products and services in the local market to be *many*.

Specifically, an ADCo can and is willing to offer elements with an economic cost of $C'(S_w)$, and at a fully remunerative price of $C(S_w)/S_w$ (*i.e.*, average cost). So long as such a firm is able to achieve sufficient scale economies, it may well be that $C(S_w)/S_w < r_{\min}$, where $r_{\min} = \min\{C(S_1) + MS_1 \cdot \gamma, C(S_i) + MS_i \cdot \gamma\}$ or, equivalently, $r_{\min} = \min\{r + z, C(S_i) + MS_i \cdot \gamma\}$. In other words, the average cost of

the ADCo may be below the opportunity cost (or minimum element price) of its potential integrated rivals.[62]

Table 2 above can be expanded to include the minimum price of the ADCo, assuming that the ADCo and the integrated provider have the same cost function, but that ADCo, by definition has no retail market share. Thus, the minimum remunerative element price for ADCo is equal to its average cost ($C(S)/S$) or TELRIC, say $18 in this case.[63] As shown in Table 4, ADCo's price is below the integrated firm's price in some cases. As the retail market share of the integrated firm rises, the ADCo price is below the integrated firm's price. The difference in prices is the result of the retail market share disincentive ($MS \cdot \gamma$) possessed by the integrated firm.

**Table 4. Minimum Element Prices**

| Integrated Firm's Retail Market Share ($MS$) | Integrated Firm's Minimum Element Price ($r_{\min}$) | ADCO Minimum Element Price ($r_{\min}$) |
|---|---|---|
| 0% | 15.00 | 18.00 |
| 25% | 17.50 | 18.00 |
| 50% | 20.00 | 18.00 |
| 75% | 22.50 | 18.00 |
| 100% | 25.00 | 18.00 |

The condition under which the ADCo can profitably service the wholesale market does not require that the ADCo exhaust its scale economies. Even if the ADCo is somewhat less efficient than larger providers, due to a smaller size, the lack of the retail-driven disincentive may allow the ADCo to profitably supply a wholesale market. Thus, the presence of more efficient, integrated firms is immaterial so long as the retail-driven disincentive to supply the wholesale market is sufficiently large.

### B. *Residual Public Interest Benefits – The Impact of the ADCo on the Incentives of the Dominant Incumbent*

Yet, perhaps the most important benefit of the ADCO would be its potential effect on the incentives of the dominant incumbent to exercise market power (*i.e.*,

[62] If not, then retail firms will pay the integrated providers their opportunity cost.

[63] The ADCo cannot sell elements at marginal cost, whereas the incumbent may do so because its network costs are sunk. In other words, an ADCo would not enter (thereby incurring sunk costs) if its expected price did not exceed marginal cost.

raise prices or restrict output) or engage in efforts to deter new entry via strategic, non-price behavior.

For example, it may just be possible that an ADCo, and its customers serving the retail market, could grow large enough so that the market shares of the integrated firms (both wholesale and retail) fall sufficiently to render them valid competitors in the wholesale market.[64] Thus, like structural separation (wholesale/retail) of the dominant provider that aims to eliminate the retail disincentive in a more direct way, the ADCo can alter the incentives of the dominant provider so that supplying the wholesale market at competitive prices is economic.

More importantly, it may be the case that the presence of an ADCo will have an even more profound effect on long-term industry structure. That is to say, ever since the time of the AT&T Divestiture, there has been great discussion about the prospect of legally mandating incumbents to separate structurally their network operations into a separate "LoopCo."[65] Structural divestiture, by separating retail and wholesale operations, eliminates the retail market share disincentive to supply the wholesale market, as well as the incentive to sabotage. Regardless of the economic merits of such a structural separation, however, such a notion appears to be a political "non-starter."[66] Given the incumbent's inherent

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[64] This result is neither indicated nor required by the model.

[65] *See supra* n. 11.

[66] For example, some argue that a LoopCo would be economically unsustainable. (*See, e.g.*, *Regulatory Overkill: Pennsylvania's Proposal to Breakup Bell Atlantic* by Jeffrey A. Eisenach, Randolph J. May, and Charles A. Eldering, Progress & Freedom Foundation (December 16, 1999) (http://www.pff.org/papucreport.htm.).) The economics indicate the opposite conclusion, however. First, the LoopCo's costs are already sunk, and it has already achieved the necessary scale economies necessary to be successful. As such, it will already be established in a market capable if sustaining only a few firms. Second, assuming *arguendo* that there no other local access facilities (or even a few), it is highly likely that regulators will still impose some sort of price regulation on the LoopCo. As such, it is unclear how a LoopCo would be economically unviable when its operational costs are guaranteed by regulation. Finally, it may turn out that the LoopCo would exceed its regulatory rate of return through the market because divestiture has removed its incentive to discriminate and replaced it instead with an incentive to sell as much of its product – *i.e.*, local access – to as many potential buyers it could find. Indeed, if a LoopCo is really such an inefficient business proposition, then why did British Telecom reject offers of $ 11.4 billion and $25.7 billion respectively for its local access networks from firms who realized the benefit of breaking out the value of BT's assets via a LoopCo? *See* Dan Roberts, *British Telecom Dismisses £8bn Local Line Bid*, FINANCIAL TIMES (July 29 2001) (quoting potential purchaser as believing that "BT has ignored the potential of its local loop because any ADSL services provided by rival operators

(Footnote Continued. . . .)

incentive to block entry discussed above, it is nonetheless reasonable to inquire whether there could be some mechanism or circumstance where an incumbent would find it more efficient to disaggregate its local access voluntarily?

The presence of an ADCo, may just be the catalyst needed to provide an incumbent with the incentive to disaggregate its network facilities from its marketing operations voluntarily. To wit, if the ADCo reveals any diseconomies of vertical integration (to the extent they exist), then vertically-integrated firms may choose to divest themselves *voluntarily*, because it would be more efficient (*i.e.*, more *profitable*) for them to do so. This voluntary restructuring would be the consequence of ADCo revealing the presence of diseconomies of scale, scope, or sequence between the retail and wholesale components of the firm.[67] A full analysis of this possibility is beyond the scope of this model and this Policy Paper, however.

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compete with its own retail division."); Andrew Ward, *WestLB in $25.7bn Offer for BT Fixed-line Network*, FINANCIAL TIMES (August 5 2001).

[67] *See* George J. Stigler, *The Economics of Information*, 69 JOURNAL OF POLITICAL ECONOMY (June) at pp. 213-225; Daniel F. Spulber, REGULATION AND MARKETS, 119-20; Williamson, *supra* n. 6.

A classic example of how changing the underlying structure of the market can force firms to "voluntarily" disaggregate can be found in AT&T's spin-off of Lucent Technologies (*né* Bell Labs). To wit, back when AT&T had a total monopoly over everything short of the spoken word, it was very efficient for AT&T to bring the terminal equipment sector of the industry "out of the market and into the firm" – *i.e.*, manufacture its terminal equipment on a vertically-integrated basis. In the mid-Eighties, however, as long-distance competition was in its infancy, a more forward-looking FCC realized that competitors should have more than one source of terminal switching equipment (*i.e.*, AT&T/Bell Labs). As such, through stringent structural regulation such as standard inter-faces and plugs, the FCC essentially carved-out the terminal equipment market to allow for competing suppliers.

By the mid-1990's, the market for terminal equipment was flourishing. Not only was there Bell Labs/AT&T, but also other vendors such as Cisco, Siemens and Nortel and a wide variety of other niche technology players as well. As the result of this competition for terminal equipment, the equipment vendor side of AT&T found it was losing customers because, as a corporate entity, it was prohibited from selling to would-be rivals, and the network/marketing side of AT&T was limited only to what Bell Labs came up with. Given this changed market structure, it was now more efficient (i.e., more profitable) for AT&T to disaggregate *voluntarily* Bell Labs (now Lucent) from AT&T's telephone business (*i.e.*, bring the transaction out of the firm and into the market). In so doing, both firms are better off, as Lucent can now sell to a wide variety of customers, and AT&T now has a choice of competing terminal equipment vendors who distinguish themselves on both a price and/or service quality or technological basis. Naftel & Spiwak, *supra* n. 37 at p. 35.

**VI. Conclusion**

The purpose of this Policy Paper is to shed some light on the path of future evolution in the competitive telecommunications industry, as well as its somewhat troubled past and present. While it is always desirable to break new ground in research, this analysis will not be particularly groundbreaking to those most familiar with the telecommunications industry. Indeed, this analysis, in many respects, is a formalization of ideas shared among industry insiders for decades.[68] The economics of the telecommunications industry, particularly the supply-side economics, have not changed that much over time. Fewness in supply is the rule, not the exception. Instead, fiber optics, and other technological innovations, notwithstanding the inherent economies of scale and sunk costs of telecommunications networks, remain key drivers of industry structure. As Professors Carl Shapiro and Hal Varian succinctly state in their book INFORMATION RULES: *"Technology Changes. Economic laws do not."*[69] Accordingly, if network-based competition of a highly fragmented nature is desired, then competition policy is fighting a losing battle.

In the most general of terms, this Policy Paper discusses important economic characteristics of local exchange markets and the firms that participate therein. First, entry into the local exchange market requires large fixed and sunk costs, making entry risky and necessitating scale economies. Consequently, only few local access networks can supply the market. These few local access networks cannot be small, however, because a large market share is required to realize sufficient scale economies to effectively compete with the ILECs and survive.

Secondly, acquiring sufficient market share to realize scale economies may be difficult for entrants that are not wholesale-only firms. Given the substantial scale economies in local exchange network, it may not be possible for a single carrier to acquire sufficient retail market share in a timely manner to exhaust economies of scale. An integrated firm supplying the wholesale market is conflicted; the integrated firm's retail market share raises the opportunity cost of wholesale supply.

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[68] Indeed, the notion of an ADCo was first fleshed out by Jerry B. Duvall in 1998. *See* "Entry by Electric Utilities Into Regulated Telecommunications Markets: Implications for Public Policy," presented before the *Communications Industry Committee, ABA Section of Antitrust Law,"* Collier, Shannon, Rill & Scott, PLLC, Washington, D.C., February 6, 1998.

[69] Carl Shapiro and Hal R. Varian INFORMATION RULES (Harvard Business School Press 1999) at 1-2 (emphasis supplied).

Accordingly, if economies of scale are sufficiently large, then reaching a scale of operation that allows the entrant to compete with the ILEC may be best achieved through a wholesale-only entry strategy – an ADCo. The ADCo can consolidate the consumer demand held by retail CLECs, thereby reducing risk and costs expanding output quickly. The disincentives to wholesale supply possessed by the integrated firm, furthermore, does not exist for the ADCo, and therefore the ADCo – unlike the ILEC – has no incentive to sabotage its customers. As a result, the ADCo provides the answer to the central objective of restructuring: that is, while the number of local access networks the market can sustain may be *few*, the wholesale nature of the ADCo nonetheless permits the number of providers of advanced telecoms products and services to be *many*.