Customer Ownership of the Local Loop: A Strategy for Implementing Competition in Telephony

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Abstract

Competition in telephony, if it is to succeed, must solve several difficult problems, including interconnection among local service providers, interconnection between local and interexchange service providers, and the transition from monopoly to competition. This paper argues that if customers own their local loops, these problems would disappear; in addition a competitive loop construction industry likely would emerge. This paper also examines several potential problems with customer ownership of the local loop, and finds that none is serious. Since customer ownership of the local loop solves several otherwise intractable problems, and since it introduces no intractable problems of its own, it is a plausible strategy for implementing competition in telephony.

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† The views expressed in this paper are those of the author; they do not represent the Office of Consumer Counsel.

1. Introduction

Competition in telephony is problematic, for several reasons. One reason is that competition assumes duplication of infrastructure, and duplication of infrastructure is expensive and not obviously beneficial. Another reason is that telephony has traditionally been provided as a monopoly service, by an incumbent that owns 100% of the infrastructure and serves 100% of the customers. Even if the cost of duplicating infrastructure were not prohibitive, it would be difficult to compete with an incumbent who has both name recognition and expertise in providing telephone service. The incumbent also has a ubiquitous network to which all entrants must interconnect–unless they plan to completely duplicate the incumbent's infrastructure, in order compete in all areas simultaneously.[1]

Because of the ubiquity of the incumbent's network, and because of the high cost of duplicating it, there is general agreement that interconnection is essential for competition in telephony.[2] However, interconnection is problematic, as well. For, even after incumbents are ordered to interconnect with entrants, the *terms* of that interconnection–its quality and, above all, its price–can remain contentious for, literally, years–as it has in New Zealand.[3] Even economists are not in agreement concerning the pricing of interconnection: some believe that the

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[1]Even with completely duplicated infrastructure, an entrant can expect to *not* interconnect with the incumbent only if the entrant expects to capture 100% of the market, literally overnight.

[2] See, for example, Walker, D. and J. Solomon, J. 1993. "The Interconnection Imperative: *E pluribus unum*." *Telecommunications Policy*, 17(4): 257-280.

Efficient Component Pricing Rule (ECPR) provides a simple answer to pricing interconnection,[4] while others claim that the ECPR provides a very poor solution, if any at all.[5] This paper argues, however, that the difficulties of interconnection–and other difficulties of competition–have a straightforward solution. If customers own their local loops, virtually all of these problems disappear, and competition in telephony becomes a plausible alternative to the traditional monoploy.

This paper is organized as follows. Section Two discusses the virtues of customer ownership of the local loop. It describes several of the major problems with competition in telephony, and shows that customer ownership of the local loop either eliminates, or greatly reduces the significance of, each problem. This section also describes one ancillary advantage of customer ownership of the local loop–the creation of a competitive loop construction industry–that is not related to the solution of any obvious problem with competition in telephony, but that is, nevertheless, a virtue of customer ownership of the local loop. Section Three discusses several apparent problems with customer ownership of the local loop,

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[3] See, for example, Tye, W.B. and C. Lapuerta. 1996. "The Economics of Pricing Network Interconnection: Theory and Applications to the Market for Telecommunications in New Zealand." *Yale Journal on Regulation*, 13(2): 419-500.

[4] See, for example, Baumol, W.J. and J.G. Sidak. 1994. *Toward Competition in Local Telephony*. Cambridge, MA: The MIT Press; and Kahn, A.E. and W.E. Taylor. 1994. "The Pricing of Inputs Sold to Competitors: A Comment." *The Yale Journal on Regulation*, 11(1): 225-240.

[5] See, for example, Albon, R. 1994. "Interconnection Pricing: An Analysis of the Efficient Component Pricing Rule." *Telecommunications Policy* 18(5): 414-420; and Economides, N. and L.J. White. 1995. "Access and Interconnection Pricing: How Efficient is the 'Efficient Component Pricing Rule'?" *Antitrust Bulletin*, 40(3): 557-579.

and shows that they are not, in fact, problems at all. A final section presents a summary and conclusions.

2. The Virtues of Customer Ownership of The Local Loop

Full competition in telephony requires the solution of numerous problems, some of which appear truly intractable. However, this section shows that customer ownership of the local loop provides an elegant, uniform solution to all of these problems. This section deals with three of the most serious difficulties that competition in telephony must overcome: interconnection among local exchange service providers,[6] interconnection between local exchange and interexchange service providers, and the transition from monopoly to competition. Customer ownership of the local loop causes each of these problems to virtually disappear. This section also discusses the likelihood that customer ownership of the local loop will create a competitive loop construction industry. This does not directly solve an obvious problem with competition in telephony, but it is clearly a virtue, because it permits loop construction to be demand driven rather than supply driven. The section concludes by explaining that customer ownership of the local loop does more than solve several individual problems with competition in the provision of telephony. Rather, it constitutes an *integrated* solution to many of the problems with competition in telephony.

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[6] The problem of interconnection among local service providers–and its solution by customer ownership of the local loop–has been dealt with in greater detail in, Schechter, P.B. 1996. "Customer Ownership of the Local Loop: A Solution to the Problem of Interconnection." *Telecommunications Policy* 20(8): 573-584.

2.1. Interconnection Among Local Exchange Providers

In order for competition in local telephony to be successful, multiple local exchange carriers (LECs) must interconnect, so that their respective customers can communicate with each other. Interconnection among competing providers of local telephony, however, has become a nearly intractable problem, because the interconnecting parties are typically of two very different types. The first type is the incumbent, who owns a complete infrastructure. The second type is the competitive entrants, who must use at least some of the incumbent's local loops, because constructing a complete infrastructure is prohibitively expensive. An entrant, therefore, typically constructs a limited infrastructure (often in a business area), consisting of a switching center and local loops to its customers; the entrant then seeks to interconnect with the incumbent. The interconnection that the entrant seeks, however, appears especially insidious to the incumbent: the entrant wishes to use the incumbent's local loops *in order to compete with the incumbent.*

Incumbents and competitive entrants rarely agree on interconnection terms: the incumbent, by refusing interconnection, can prevent competition; the entrant, by obtaining free (or below cost) interconnection, can avoid much of the loop construction cost born by the incumbent. Thus, it is in the incumbent's self-interest to price interconnection high, and it is in the entrant's self-interest to price interconnection low. Needless to say, there is no consensus concerning the proper price of interconnection. However, the price of interconnection is critical to the success of competition. If the incumbent charges the proper price, then

entrants that are more efficient than the incumbent will have incentive to construct their own network (they will thereby lower their costs), and provide facilities-based competition. If interconnection is priced too low, however, the incumbent will not recover its costs of loop construction and maintenance, and an inefficient entrant will have incentive to resell the incumbent's network services rather than to construct its own network. If interconnection is priced too high, an entrant will be unable price its service at a level that allows it to compete with the incumbent.

This is not a problem that has a simple regulatory solution. The problem is *not* that the proper price for interconnection is well known, but that neither the incumbents nor the entrants are willing to accept a regulatory mandate that an entrant pay that price. Rather, the problem is that no one knows what that proper price is, nor does anyone know how to determine it.[7]

There is a straightforward solution to the question of interconnection pricing: customers should own their local loops. If customers own their local loops, interconnection among competing local service providers would still be necessary. However, it should not be difficult for companies to negotiate, or for regulators to mandate, its terms and conditions. For, when customers own their local loops, service providers negotiate from relatively symmetrical positions: each provides service to its customers, but none is required to rent the use of its competitor's bottleneck facility–from its competitor–at a price that includes its

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[7] Or, at the very least, there is no agreement on what that proper price is, or on how to determine it.

competitor's monopoly rent. Or, none is required to rent the use of *its* bottleneck facility *to* a competitor, at a price that does not cover the large embedded cost of constructing that bottleneck facility. Interconnection, when customers own their local loops, becomes connecting one service provider's switch to another's; it is reasonable to share the cost of the trunks that provide this connection.

The issue of paying for the cost of terminating calls on a competitor's network should also disappear, because the cost of call termination itself is near zero. Or, even if it is not near zero, it is probably less than the cost of billing for call termination. And, when customers own their local loops, incumbents provide no more value to entrants than entrants provide to incumbents: it is the *customers*, not the LECs, who own the local loops, and who are making them available to terminate a call.

2.2. Interconnection Between Local Exchange and Interexchange Providers

The preceding section has shown that–without customer ownership of local loops–interconnection among LECs is especially problematic, because the incumbent is being asked to provide an input (the local loop) to the entrant, in order to enable the entrant to compete with the incumbent. When LECs interconnect with interexchange carriers (IXCs), however, no such problem exists, because LECs and IXCs provide complementary services. In fact, interexchange service would be useless without local service, and local service would be reduced in value (to many customers, at least) if it were provided without connection to interexchange service providers. Nevertheless, interconnection between LECs and IXCs is not without problems. This section

describes the problems with interconnection between LECs and IXCs, and shows that customer ownership of the local loop reduces the severity of those problems.

2.2.1. Joint and Common Costs

Until 1930, long distance (interexchange) service n the U.S. was billed using “board to board” accounting. Under this accounting method, the interexchange carrier received 100% of the revenue from interexchange service. The reasoning for board to board accounting was as follows: the provision of a connection from a customer's premises to the central office, and the provision of a connection from the central office to a customer's premises, are the normal functions of a local exchange company. The fact that those connections are sometimes for the origination and termination of interexchange service is irrelevant: the LEC is paid to provide connections between customers' premises and central offices, so it should do so. The LEC plays no part in carrying traffic between central offices, and so receives none of the funds for those services.

State regulators realized that the physical plant necessary for local Service–including telephones, inside wiring and local loops (all of which were, at the time of this realization, still owned by the LECs)–was also necessary for, and also used in the provision of, long distance service. They argued, therefore, that IXCs should pay a part of the cost of the “local” physical plant.[8] In 1930, the U.S. Supreme Court ruled in favor of this argument: because the local network is used jointly for local and interexchange traffic, its cost must be paid jointly by LECs

[8] They also realized, of course, that if some of the cost of the local plant were shifted to long distance service, then the price of local service could be reduced.

and IXCs.[9] This decision mandated the use of "station to station" accounting for long distance service: the cost of such service is not merely the cost of carrying traffic from the originating central office's switch ("board") to that of the terminating central office. Rather, the cost of long distance service must include the cost of carrying traffic all the way from the originating telephone ("station") to the terminating one; the process of determining how much of the cost should be born by LECs and how much by IXCs is called *separations*.

The institution of separations involved an interesting trade-off between cost and authority: if the states had been willing to retain board to board cost allocation, then there would have been no role for federal regulators in setting rates of local telephone companies. However, by arguing for station to station allocation, state regulators ceded some of their control to federal regulators– presumably because they believed that lower local rates were more desirable than maintaining complete control over those rates.[10]

Unfortunately, separations are not easily specified. The earliest separations case was in New York, in 1910. The New York Public Service Commission concluded,

> It is impossible to determine the cost of the toll service separately from that of the local service for the reason that the greater part of the cost of both is joint cost and there is no way of allocating the proper portion of the joint cost to each branch of service.[11]

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[9] Smith v. Illinois Bell Telephone Company, 282 U.S. 133 (1930).
[10] See, for example, Brock, G.W. 1994. *Telecommunication Policy for the Information Age: From Monopoly to Competition*. Cambridge, MA: Harvard University Press, pp. 66 *ff*.
[11] Gabel, R. 1967. *Development of Separations Principles in the Telephone Industry*. Michigan: Michigan State University, p. 22.

Despite this finding in New York State, separations have been ubiquitous at least since *Smith vs. Illinois*. Before 1984, when the majority of local traffic and nearly all long distance traffic was carried by AT&T and its affiliates, much of the impact of separations was on which regulatory body–state or federal–had jurisdiction over, rather than on the economic welfare of, the telephone company.[12] After divestiture, however, separations represented real money, paid by IXCs to LECs. These payments currently are in the form of *access charges*, which are approximately four cents per minute each, to the originating and terminating LECs.

Part of this fee makes sense, and is relatively straightforward to determine: the part that is usage sensitive. The usage sensitive portion includes switch sizing, and some percentage of maintenance, building costs, etc. However, the major cost of local service–the local loop–is wholly traffic *in*sensitive: the entire cost of the local loop is in its construction and maintenance–even if it is never used! In other words, the wire does not wear out faster if it carries more electrons. Thus, usage-based separation of costs between local and interexchange traffic on the local loops is impossible to justify quantitatively. As telephone companies upgrade their networks, this problem gets worse: telephone companies often contemplate (at least) an upgrade that will add the capacity for carrying high-speed data (including video), as well as voice traffic, over their local

[12] Not *all* of the impact was on regulatory jurisdiction: AT&T was the near-monopoly provider of long distance service, but there were hundreds of independent–non-Bell System affiliated–LECs. They received payments from AT&T in proportion to usage of their facilities in originating and terminating interexchange calls.

loops. In these cases, the issue of assigning costs to different services becomes more complex, with no obvious solution in sight:

> There is perhaps no better example of the inability to learn from history than the current disputes over the proper apportionment of fixed and common costs. We appear to be preparing to replay the futile search in the 1960s and 1970s for methods to apportion AT&T's fixed and common costs, an exercise that ended in failure. It is essential that alternative regulatory schemes be developed to avoid this fruitless exercise.[13]

If, however, customers own their local loops, the allocation of joint and common costs to various services becomes a moot point: each customer would purchase and maintain a local loop appropriate for the mix of services that customer plans to use; the *amount* of use of the local loop is completely unrelated to the costs of its construction and maintenance. Thus, the determination of the payments that IXCs, or other service providers, should make to LECs for originating and terminating their traffic would be relatively straightforward. It would require only determining the total cost of the local plant and the total number of minutes that it is used, in order to calculate a per-minute usage charge for *any* user–IXC, LEC, video provider, etc. The problem of allocating a non-usage sensitive cost–the local Loop–among several users is, thus, avoided.

2.2.2. The CPE Model for Interexchange Service

In 1974, the U.S. Department of Justice (DOJ) filed an antitrust suit against AT&T, on the basis of claims that AT&T had aggressively resisted interconnection with competitors in long distance service. The theory of the

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[13]Crandall, R.W. and L. Waverman. 1995. *Talk is Cheap: The Promise of Regulatory Reform in North American Telecommunications*. Washington, D.C.: The Brookings Institution.

DOJ's case reflected their belief that long distance service was similar to customer premises equipment (CPE), which by then was no longer a part of the regulated telephone monopoly.[14] According to the DOJ's view, customers should be free to purchase any long distance service they wish, and connect it to their network–period. Implementation of the CPE model for interexchange service, however, would have eliminated the substantial amount of money–the exact amount of which was determined by the separations process–that was transferred from long distance to local service providers under then current agreements. The elimination of this transfer would have increased local telephone rates substantially, and so the CPE model was opposed by state regulators.[15]

Without something like the CPE model of long distance service, we are left with a complex system of separations, in which it is necessary to assign the various joint and common costs of local and long distance service (as well as of any new services, such as video on demand, or home shopping, or cable TV) to the respective services. It is extraordinarily difficult to assign costs proportionally to different services, and to re-assign those costs when new services are provided over existing infrastructure. However, it is even more difficult to do such a cost assignment in light of the fact that the majority of the joint and common cost is the local loop, which is not traffic sensitive. However, if customers own their local

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[14] Brock, G.W., *op. cit.*, p. 175.
[15] See, for example, Brock, G.W., *op. cit.*, pp. 173-194, for a detailed description of the various plans that were considered during the period surrounding the settlement of the 1974 anti-trust suit.

loops, then the CPE model is straightforward to implement: the majority of the joint and common costs are paid for by each customer who purchases a local loop, and remaining joint and common costs are probably either small enough to be negligible, or traffic sensitive so that they can be easily apportioned on the basis of use, or both.

2.3. The Transition to Competition

If competition in telephony is to be successful, it is essential to devise a plan for the transition from the current state, where service is provided by regulated monopolies, to a future in which service is provided by competing firms. The reason such a plan is essential is that competition will not be starting from a neutral position. So long as the incumbent monopolist is permitted to be a player in the competitive future, the early competitive period will include competitors with vastly different amounts of market share, name recognition, expertise and experience. This section discusses some problems of the transition to competition, and argues that customer ownership of the local loop can play a key role in their solution.

2.3.1. Cost-Based Pricing

Currently, local service prices are based only vaguely upon costs. Thus, while prices may be identical within an entire metropolitan area, costs most likely are not: it is virtually always more expensive to provide service to an outlying suburban neighborhood than to a central city neighborhood or to a downtown business district. In addition, business prices are often about twice as high as

residential prices, but the cost of providing service to businesses is probably similar to, or modestly greater than, the cost of providing residential service.[16]

The reason cost-based pricing (or the absence thereof) is an issue for the transition from monopoly to competition is that competitive entrants will, clearly, choose to enter exactly those markets where prices are above costs, and to ignore those markets where prices are below costs. This is likely to result in market failure, for two reasons. When the incumbent's price is *above* its cost, an entrant need not be more economically efficient than the incumbent in order to capture market share–it need only be sufficiently efficient to produce at a cost below the incumbent's *price* (this is often called “cream skimming,” and is done by entrants). When the incumbent's price is *below* its cost, an entrant can be more economically efficient than the incumbent but still refrain from entry: it needs to be sufficiently efficient to have costs below the incumbent's *price*, not just below its cost (this is often called “predatory pricing,” and is done by the incumbent).

So, if telephone service were priced at cost, there would be little worry of inefficient entry or of efficient non-entry. Since the major difference in the cost of providing local service to different customers is the cost of the respective customers' local loops, customer ownership of the local loop would virtually eliminate the need for price differentials, thereby virtually eliminating the

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[16] This is difficult to determine: business use tends to be during the busy hours of the day, and so determines network capacity requirements, while residential use tends to be of otherwise excess capacity. On the other hand, businesses tend to be congregated in downtown or other high density areas, where running wires is expensive, but where there are many customers per mile of wire. Residential customers are often in distant suburbs or low density neighborhoods.

dangers of cream skimming and predatory pricing. Differences in time-of-day, and volume, usage patterns between business and residential customers–or even among groups of business or residential customers–may still require pricing differentials. These differentials, however, would be usage-based, and so could be easily be applied to *anyone*–business or residential customer–whose usage generates demands for additional busy hour capacity. In New Zealand, for example, Telecom Corporation of New Zealand, charges 3.55¢ per minute for calls during peak hours, and 0.44¢ per minute for calls during nights, weekends and holidays.[17]

There are two major reasons for the absence of cost-based pricing in local telephone service. First, there is political pressure on state regulators (who are typically appointed by elected state officials) to maintain low residential telephone rates. Second, non-cost-based pricing is used to fund universal service–the availability of telephone service to all, at a reasonable price. The current industry/regulatory environment achieves a "reasonable" (below cost) price for high cost customers–primarily those who are far from the central office and have long local loops–by charging an above cost price to low cost customers. This is the reason that cream skimming has deleterious effects on universal service, as currently implemented. Namely, cream skimming removes from the incumbent's market the high price, low cost customers (for an entrant need not be particularly efficient to serve those customers at a price lower than the incumbent's), the

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[17] Crook, J. 1995. "Competition and Interconnection: Successes and Challenges. A Practical Perspective." Paper presented at *ITS Workshop on Interconnection*, Wellington, NZ, p. 6.

profits from whom are used to subsidize low price, high cost customers. Thus, with the advent of competition, it is likely that competitive entrants will choose to provide service primarily to high price, low cost customers–leaving the incumbent with no customers paying above-cost prices whose profit it can use to subsidize its customers paying below-cost prices.

So, there are two types of problems posed by non-cost-based pricing for the transition to competition. First, inefficient entry may be encouraged and efficient entry may be discouraged; second, subsidies for high cost users will be unlikely to survive. Customer ownership of the local loop eliminates both of these problems by eliminating the need for, or the temptation of, non-cost-based pricing. A call from a business customer is no more expensive to switch than is one from a residential customer; likewise, a call from a remote area is no more expensive to switch than is one from a central city. It is the costs of the local loops that differ for different customers, as the lengths of those loops differ. If customers own their local loops, the cost of providing service to all customers will be approximately the same. Then, there will be no low cost and high cost customers, so there will be no need for the former to subsidize the latter, and there will be no danger of discouraging efficient entry and encouraging inefficient entry.[18]

[18] Customer ownership of the local loop is not necessary to achieve the advantages described above. *Any* method of implementing cost-based pricing will also achieve those advantages.

2.3.2. The Cost of Entry

Even if prices were based on cost, however, the transition to Competition–in the current telecommunication environment–would not be simple. For, in order for an entrant to compete, it must make large investments in infrastructure.[19] In New Zealand–a country of about 270,000 square km and about 3.5 million people[20]–BellSouth's Director of Strategic Planning has recently estimated that the cost of entry into the telecommunication market is at least $NZ 250 million.[21] In the United States, about 60% of the book value of the LECs' plant is in transmission equipment and wire and cable, "most of which represents local loop plant."[22] Clearly, eliminating the cost of constructing local loops would significantly decrease the cost of entry into the telecommunication market. And, equally clearly, if customers owned their local loops, the cost of constructing local loops would be eliminated from the cost of competitive entry into telecommunication.

2.3.3. Unbundling and Resale

Another difficulty with the transition to competition–one which is also related to the cost of duplicating the local loop–is the issue of unbundling and resale. Typically, part of the legislative underpinnings of competition require the

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[19] It is exactly these large investments that have led to the common belief that interconnection–including use of at least some of the incumbent's local loops–is necessary for competition.

[20] United States Central Intelligence Agency. 1994. *The World Factbook*. Washington, D.C.: U.S. Government Printing Office, p. 285.

[21] Davies, M. 1995. Paper presented at ITS Symposium on Strategic Alliances and Interconnection, Boulder, CO.

[22] Arellano, M. 1995. "Exploiting the LECs' Achilles' Heel." *Telecom Strategy Letter,* (July). Available in Lexis/Nexis, *News* Library, *Curnws* File.

incumbent to separate various elements of its retail service package, and to resell them–individually–to competitive entrants. For example, the U.S. Telecommunications Act of 1996 specifies that the incumbent has

> (3) The duty to provide, . . ., nondiscriminatory access to network elements on an unbundled basis at any technically feasible point . . . . An incumbent local exchange carrier shall provide such unbundled network elements in a manner that allows requesting carriers to combine such elements in order to provide such telecommunications service.
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> (4) The duty to offer for resale at wholesale rates any telecommunications service that the carrier provides at retail to subscribers who are not telecommunications carriers. . . .[23]

The justification for a resale requirement is that it reduces the cost of entry: a competitive entrant can "lease" network elements that it is unable (or unwilling) to produce itself, and package those elements with the ones that it does produce itself, to create a complete service package. The justification for an unbundling requirement is that it permits the entrant to lease only those network elements that it does not produce itself, and prohibits the incumbent from determining what combination of elements an entrant will be able to resell.

There is a major difficulty with resale, however: it provides only modest competition, at best. For, if major portions of an entrant's retail service package are merely resold elements of the incumbent's products, then what is the likelihood that the entrant will be more efficient than the incumbent? Or, a major purpose of competition is to increase economic efficiency; however, an entrant who competes primarily by reselling the incumbent's service elements will be

[23] 47 USC 251 (c) (3), (4)

unlikely to provide competitive pressure on the incumbent. In fact, unbundling and resale has no built-in mechanism for distinguishing between inefficient entrants, that succeed only because of the unbundling and resale requirements, and efficient entrants, that are protected from unfair competition by unbundling and resale requirements.

It is possible to create only *temporary* unbundling and resale requirements, with the understanding that an entrant is provided with competitive assistance only to help it become viable; after a certain period of time–or after attaining a certain market share–such requirements would be removed, and the entrant would have to compete on equal terms with the incumbent. In the U.K., for example, Mercury's interconnection price rises sharply once its payments to British Telecom exceed 7% of BT's "corresponding aggregate revenues."[24] This, however, introduces a new problem: exactly when should the temporary period end? There is no clear principled method of determining how long an entrant should receive favorable treatment; the entrant will argue for such treatment to last as long as possible, while the incumbent will argue for it to last as short as possible. In this case, the success of an entrant is likely to rely as much (or more) on its legal strategy as on its economic efficiency.

Two other problems with unbundling and resale requirements are related to the symmetry of their application, and what kinds of incentives they provide. The symmetry issue is, should unbundling and resale requirements pertain to

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[24] Walker, D. and J. Solomon, J., *op. cit.*, p. 267.

entrants as well as to incumbents? Entrants, of course, will say "no" (as does the U.S. Telecommunications Act of 1996): they may have built fiber optic rings in the business centers of large cities, and they see these rings (probably correctly) as their major competitive advantage. They will probably couch their objections in terms of economic efficiency: if they are forced to resell their infrastructure to the incumbent, what incentive will the incumbent have to create its own modern infrastructure?[25] However, this objection is equally applicable to the incumbent: if the incumbent is forced to resell its infrastructure to an entrant, what incentive will an entrant have to create *its* own infrastructure? Enacting asymmetrical regulation is extraordinarily problematic; it virtually always results in *ad hoc* application of its details. Such application, even when done by people of intelligence and good will, is rarely as defensible as symmetrical regulation. With regard to regulation of telecommunication in general,

> . . . symmetric regulation should be adopted for the increasingly competitive telecommunications sector. This is required to provide market-based price signals which induce efficient investment and entry. All forms of asymmetric regulation contain an intrinsic bias toward some firms or technologies and run the risk of imposing large productive efficiency costs.[26]

With customer ownership of the local loop, however, the issue of unbundling and resale is at least greatly mitigated. For when customers own their local loops, competitive entrants are relieved of a large amount of the cost

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[25] See the Report of the HB 1335 Telecommunications Working Group to the Colorado Public Utilities Commission (30 November 1995) for an example of just such a series of arguments.

[26] Schankerman, M. 1996. "Symmetric Regulation for Competitive Telecommunications." *Information Economics and Policy* 8(1), p. 3.

burden of entry. It is probably reasonable to claim that an entrant who cannot raise the capital for switches, inter-office trunks and their maintenance is unlikely to succeed, and that providing it with favorable treatment–for *any* period of time–is likely only to encourage inefficient entry.

2.4. Loop Construction as a Competitive Industry

If customers own their local loops, then it is reasonable to assume that loop construction will become a competitive industry. Thus, just as there are multiple providers of television sets, or high fidelity audio components, there can be multiple providers of local loops. This has two major advantages over the current situation. First, there are the usual benefits of competition: efficient use of resources, cost-based pricing, technological innovation, and consumer choice. The second advantage is perhaps more subtle: it makes loop construction demand-driven rather than supply-driven. In other words, customers will–if the loop construction industry is truly competitive–be able to choose the technology they value for their local loops. This is an advantage for producers as well as for consumers: it is an advantage for consumers because they will be able to arrange for the loop technology that meets their needs or desires; it is an advantage for producers because they will not have to gamble on implementing a particular loop technology, and hope that customers will be willing to pay for it by subscribing to services that have its cost embedded in their price. With a competitive loop construction industry, it is not unreasonable to expect that some customers will choose “ordinary” copper twisted pair, while others will choose coaxial cable, fiber optic cable, or radio. So long as customers pay for

their choices, providers have no reason to construct only a single type of local loop.

2.5. Customer Ownership of the Local Loop: A Simple, Integrated Solution

A major strength of customer ownership of the local loop is that it provides a simple, integrated solution to the problems of competition in telephony. The solution that it provides is simple because it is a principled solution that doesn't require constant monitoring and adjusting to make it applicable to changing circumstances. For example, it may be possible to determine the perfect price of interconnection. However, if the incumbent (or a competitive entrant) were to decide to upgrade its local loops to optical fiber, for example, then an entirely new interconnection pricing scheme might have to be negotiated. Or, perhaps somehow the perfect allocation of joint and common costs between local and long distance service could be determined. However, if video (or data, or any other new service over the network) were then introduced, an entirely new allocation of joint and common costs would have to be made. With customer ownership of the local loop, of course, it is the *customer* who decides to upgrade his or her loop, or to subscribe to a new service; just as interconnection and allocation of joint and common costs are non-problems with one type of local loop, or with one mix of services, so they remain non-problems when a new local loop technology, or a new service mix, is introduced.

The state of Kansas has recently proposed a plan for local exchange competition that is designed to provide *complementarity* among its components (two actions are complementary if “doing more of one increases the gain from

doing more of the other"[27]). When analyzing the complementarity of a set of actions, all interactions among those actions must be analyzed. Complementarity may be considered the existence of *positive* interactions among the set of actions; there is, of course, the possibility of negative interactions, as well. Clearly, it is preferable to solve multiple problems with a single action, because when there is only one action, there is no *possibility* of negative interactions (although, of course, a single action can have, simultaneously, positive effects on some problems and negative effects on others). Customer ownership of the local loop is just such a single solution to multiple problems. A situation in which there is a single solution to multiple problems may be considered a logical extension of complementarity: in such a situation, doing just that single action increases progress toward the solution of *several* problems. In addition, it is probably simpler to implement a single action than to implement multiple actions, and it is probably simpler to analyze the effects of a single action than to analyze those of multiple actions.

3. Some Potential Problems With Customer Ownership of the Local Loop

It is possible that there are problems with customer ownership of the local loop, some of which may be sufficiently severe to suggest that customer ownership of the local loop creates more problems than it solves. This section considers seven such problems. Can customers afford to purchase their local loops? What will happen to universal service, if customers must own their loops?

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[27] Temin, P. and J.H. Weber. 1996. "Introducing competition into local exchange markets." *Telecommunications Policy* 20(6): 429-442.

What should the incumbent do about existing, undepreciated, local loops that customers do not purchase? Does customer ownership of the local loop constitute an unconstitutional taking of the incumbent's property? How can a customer whose loop is part of a loop carrier system own his or her local loop? Can renters be expected to own their local loops? and Will customers be willing to have maintenance responsibility for their local loops? Each of these problems is shown to be either not particular to customer ownership of the local loop, or easily surmountable, or both.

3.1. Cost

Are local loops too expensive for customers to own? Estimates of the cost of local loops vary–in part because of different assumptions and methodologies used in generating those estimates. Estimates based on new construction, using modern technology, suggest an average cost of about $700 per local loop.[28] If a customer finances $700 for ten years at 7% APR, the monthly payments would be about $8.10 (this amount is remarkably close to the $8.00 subscriber line charge proposed by the FCC in the early 1980s[29]); the median annual household income in the U.S., in March, 1994, was $31,241.[30] Alternatively, if a new network were built, using modern technology, with an expected life of 18 years, the average monthly cost of providing basic residential service for the entire U.S. (including, of course, the cost of loop construction) was recently estimated at

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[28] Reed, D.P. 1992. Residential Fiber Optic Networks: An Engineering and Economic Analysis. Norwood, MA: Artech House, pp. 288-289.
[29] Brock, G.W., *op. cit.*, pp. 187 *ff*.
[30] United States Bureau of the Census. 1995. *Statistical Abstract of the United States* (115th edition.) Washington, D.C.: U.S. Government Printing Office, p. 473.

$21.30.[31] If there are people who would like telephone service but who cannot afford $21.30 per month, it is reasonable to expect the state to subsidize telephone service just the way it subsidizes housing, food, medical care and education–if telephone service is considered a similar necessity.

3.2. Universal Service

The question of what to do if some customers cannot afford to purchase their local loops is the issue of universal service. Historically, universal service was supported by a variety of explicit and implicit subsidies: the basic service of some customers (such as business customers) was priced above cost, and some services (such as interexchange service) were priced above cost, in order to price service in high cost areas below cost.[32] The justification for this price averaging was the network externality: the network is more valuable *to everyone* if there are more customers connected to it. Thus, customers in low-cost areas subsidize customers in high-cost areas, but the customers in low-cost areas also benefit from this subsidy. This is so because customers in high-cost areas would not connect to the network if they had to pay the full cost of such connection, and customers in low-cost areas (as well as those in high-cost areas) benefit when those in high-cost areas are connected. At the present, when more than 90% of households have telephone service, it is not clear that the value of the network externality is as great as the cost of the price averaging that it justifies. However,

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[31] This is calculated from data in, Hatfield Associates, Inc. 1994. "The Cost of Basic Universal Service," p. 4, Table 2.

[32] Brock, G.W., *op. cit.*, p. 75.

as telecommunication has become ubiquitous, connection to the telephone network has come to be considered virtually a necessity for modern life.

Although cost averaging is the traditional mechanism for supporting universal service, it developed in the day of the single, integrated telecommunication provider. Cost averaging is problematic when telecommunication is provided by multiple competitors. Cream skimming and predatory pricing are two of the problems with cost averaging in a competitive environment; their impact on competition has been discussed in Section 2.3.1, above. A third problem with cost averaging is related to the method of providing subsidies in general. Typically, when necessities are subsidized by society, the subsidy is based upon a means test. This is because the purpose of a subsidy is to enable low-income households to obtain a necessary good or service. Thus, customers with low incomes–*not* customers who live in high-cost areas–receive food stamps, subsidized medical care, and subsidized housing, for example. When subsidies are based upon geographical considerations alone, one result is that working-class inner city residents–who live in low-cost areas–subsidize local exchange service for wealthy mountain community residents–who live in high-cost areas. It is unlikely that this is the intention of proponents of universal service.

The preceding discussion is a selective paraphrasing of the on-going debate over the future of universal service in the US,[33] the UK,[34] and the EC[35] Does customer ownership of the local loop make the problem of universal service easier–or harder–to solve, or does it have no obvious effect on the problem?

It is not clear how customer ownership of the local loop could make universal service a more difficult problem to solve: it is unlikely that the cost of service would increase because customers owned their local loops; indeed, if a competitive loop construction industry arises, it is reasonable to expect that the cost would *decrease*. So, at worst, customer ownership of the local loop should not make universal service more of a problem than it currently is. However, it is reasonable to make a stronger claim: customer ownership of the local loop has the potential of making universal service *less* of a problem than it currently is. This is because the local loop is the dominant cost of providing local telephone service: the local loop accounts for approximately 60% of US West's costs, for example,[36] and a comparable portion of the total book value of the LECs' plant.[37] Customer ownership of the local loop would make that cost–and its dominance–

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[33] See, for example, Borrows, P.E., P.A. Bernt and R.W. Lawton. 1994. "Universal Service in the United States: Dimensions of the Debate." *National Regulatory Research Institute*. Publication 94-08; Federal Communications Commission. 1996. *Notice of Proposed Rule Making on Universal Service*, at **http://www.fcc.gov/Bureaus/Common_Carrier/fcc96093.txt**; and Mueller, M. 1997. *Universal Service: Competition, Interconnection, and Monopoly in the Making of the American Telephone System*. Cambridge, MA: The MIT Press.

[34] See, for example, OFTEL. 1996. At **http://www.open.gov.uk/oftel/univcons/univ_1.htm**.

[35] See, for example, ISPO. 1996. At **http://www.ispo.cec.be/infosoc/legreg/9673.html**.

[36] Johnson, B. (Director of Colorado Regulatory Affairs, US West Communications). Personal communication, December, 1995.

[37] Arellano, M., *op. cit.*

explicit. And, since differences in local loop cost are the major reason for differences in local service cost, when customers own their local loops, it will be clear which customers have high costs and which have low costs. In such an environment, it would be straightforward to request–and justify–subsidies for customers whose loop costs exceed a certain percentage of their household incomes (for example), or whose household incomes are below a certain threshold (for example). It would be, obviously, equally straightforward to deny subsidies to customers whose incomes are clearly sufficient to pay for their local loops.[38]

3.3. What Should Incumbents Do With Obsolete Infrastructure?

If customers must own their local loops, it is likely that local loop construction will become a competitive industry. Customers who are satisfied with their existing loops will probably purchase them from the incumbent; customers who are not will have new loops constructed–by the incumbent or by another company. What should the incumbent do with the local loops that customers do not purchase? In a competitive industry, this is a non-issue: what does an automobile manufacturer do with automobiles that customers do not purchase? It discounts them, and writes off the loss. In telecommunication, this

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[38] In general, universal service is a political and/or social problem, not an economic one: it is not difficult to conceive of economically efficient solutions to the problem that not all customers can afford to connect to the network. Universal service is discussed in this paper because it is a sufficiently important problem that if customer ownership of the local loop made it impossibly difficult, for example, that would be a strong argument against customer ownership of the local loop. However, the proposal that customers own their local loops should not stand or fall on the quality of the "solutions" proposed above to the problem of universal service. This section is intended to argue that customer ownership of the local loop does not exacerbate the problem of universal service; it is not intended to solve the problem of universal service.

isn't a non-issue, because the incumbent has typically not been free to unilaterally determine the period of time over which loop construction costs are recovered.

There are two types of principled answer to this question. One type of answer argues that incumbents should be reimbursed (by *someone*) for all undepreciated loops that customers don't purchase. This type of answer might argue that incumbents should be guaranteed that the difference between the revenue generated from the sale of existing local loops and the undepreciated portion of their local loop plant should not be negative. This type of answer–guaranteeing that the incumbent does not end up with undepreciated local loops–has the advantage of not penalizing the incumbent for long depreciation schedules, when those schedules have benefited customers by reducing the price of local service. This type of answer has the disadvantage of providing no incentive to the incumbent to sell existing local loops. It also creates new questions: What will be the source of funds to reimburse incumbents for unsold, undepreciated local loops? Will incumbents be permitted to have the revenue generated from the sale of existing local loops be greater than the undepreciated portion of those local loops? Will the prices of local loops be the average undepreciated cost of all loops, or will each local loop be priced to recover *its* undepreciated cost? *Etc.* . . .

The second type of answer argues that incumbents should write off any losses from unsold, undepreciated local loops. This type of answer argues that incumbents have benefited from their (past) status as regulated monopolies. They

have not been free to unilaterally determine depreciation schedules, but they have, nevertheless, benefited from such schedules because low local service prices have allowed telephone penetration rates to exceed 95%, in the U.S. This type of answer has the advantage of being market based: it provides incumbents with the incentive to creatively minimize potential losses from unsold local loops. This type of answer has the disadvantage that it may require the incumbents to write off as much as 50% of their local loop construction costs.[39] (The 50% figure is based on the implausible assumption that *no* customers will purchase their existing local loops.)

As usual, it seems preferable to choose a market based solution over a regulation based one. Doing so includes risks to the incumbent, but competition includes risks for *all* competitors. This issue is treated in greater detail, but with the same conclusion, elsewhere.[40]

3.4. Takings

The Fifth Amendment of the Constitution of the United States prohibits the government from taking private property without compensatory payment: ". . . nor shall private property be taken for public use, without just compensation." This has been considered relevant primarily to the condemnation of private property for public use, under the right of eminent domain.[41] There have been,

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[39] Baseman, K.C. and H. Van Gieson. 1995. "Depreciation Policy in the Telecommunications Industry: Implications for Cost Recovery by the Local Exchange Carriers." MiCRA, Inc., (December), p. 18, Table 9.
[40] Schechter, P.B., *op. cit.*, pp. 579-581.
[41] Epstein, R.A. 1985. *Takings: Private Property and the Power of Eminent Domain*. Cambridge, MA: Harvard University Press.

however, recent suggestions that regulation might constitute a form of taking.[42] Recently, the U.S. Supreme Court required the state of South Carolina to fully compensate the owner of two parcels of land, because the state completely forbade construction of new homes close to the beach.[43] Compensation was required because South Carolina imposed a *complete limitation* on Lucas' use of his land.[44]

In telephony, Bell Atlantic and other Regional Bell Operating Companies have argued that the FCC's physical co-location order violated the Fifth Amendment's takings clause.[45] The U.S. Court of Appeals vacated the physical co-location requirement, but *not* on Fifth Amendment grounds. Rather, they ruled that the FCC had no authority to impose physical co-location. They pointed out that, "The Tucker Act, 28 U.S.C. @ 1491(a)(1), vests exclusive jurisdiction over takings claims that exceed $10,000 in controversy, as this one obviously does, in the Unites States Claims Court."[46] This ruling has not prevented Pacific Bell and other RBOCs from arguing before the same U.S. Court of Appeals that the FCC's *virtual* co-location orders do not differ significantly different from its (vacated) physical co-location orders, in that they represent a taking of property for which the RBOCs must be compensated.[47]

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[42] Epstein, R.A. 1995. *Simple Rules for a Complex World*. Cambridge, MA: Harvard University Press, pp. 130-137.
[43] Lucas v. South Carolina Coastal Council, 112 S. Ct. 2886 (1992).
[44] Epstein, R.A., 1995., *op. cit.*, p. 130.
[45] Bell Atlantic Telephone Companies, *et al.*, v. FCC; case no. 92-1619.
[46] 24 F.3d 1441 (1994), note 1.
[47] Pacific Bell *et al.* v. FCC, consolidated cases beginning at 94-1547. Cited in *Telecommunications Reports*. 1995. "In Court Argument, Bell Companies Question Constitutionality of Virtual Collocation Rules." October 23.

The theory of regulatory takings is complex and has only begun to be considered by the courts; a complete treatment of the issue is beyond the scope of this paper. And while it is possible (perhaps even likely) that incumbents will claim that mandated customer ownership of the local loop is unconstitutional because some undepreciated local loops must be abandoned by their owner, this possibility appears remote:

> The modern view is to say that government regulation of use is not a taking, for which compensation is payable, unless and until government restrictions go "too far." [footnote omitted] Yet it now appears that this point is never quite reached unless the state imposes a *complete limitation* on land use. As long as any beneficial use is left to the owner of the land, the courts will not inquire into the reasons for the regulation or demand compensation for the loss of value that the restrictions impose.[48]

The only cases in which the state would be imposing "a *complete limitation*" on use of a LEC's property would be when a LEC was unable to sell a *wholly undepreciated* loop. With a reasonable period of time between the adoption of a requirement that customers own their local loops and the full implementation of that requirement, there would be *no* such loops–because LECs would reasonably be permitted to install new loops only in situations in which customers have agreed to purchase them. In addition, mandated customer ownership of local loops does nothing to *prevent* a LEC from recovering its investment in that loop: customers are free, of course, to purchase existing loops, so all LECs have the *opportunity* to recover undepreciated costs.

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[48] Epstein, R.A., 1995, *op. cit.*, p. 130.

3.5. Jointly Owned Portions of Loops

Loop Carrier Systems time-multiplex traffic from hundreds of local loops onto a single pair of wires (or an optical fiber). Loop Carrier Systems are used when the electronics for multiplexing (and demultiplexing) are less expensive than the wire that they replace.[49] How can customers own their local loops, when not all of "their" local loop is theirs? The most familiar model for solving this problem is the condominium: each customer could individually own the wires from the multiplexer to the his or her premises, and from the switch to the multiplexer. The carrier system itself could be jointly owned, by a Carrier System Association–to which each customer who used the carrier system would belong. The Association would have rules and regulations, specifying rights, responsibilities, shared costs, etc.

There are at least two alternative models for customer ownership of local loops that are partly comprised of a loop carrier system. One is the indefeasible right of use (IRU) model: each owner of a communication satellite, or an undersea cable, is guaranteed an indefeasible right of use of a certain portion of the satellite's (or cable's) capacity.[50] The second model is provided by the joint ownership agreements often used when multiple companies own an oil pipeline and a portion of the pipeline's capacity.

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[49] Andrews, F.T. 1991. "The Evolution of Digital Loop Carrier." *IEEE Communications Magazine* 29(3): 31-35.
[50] See, for example, Goldberg, H. 1985. "One-Hundred and Twenty Years of International Communications." *Federal Communications Law Journal*, 27(1), p. 139.

3.6. Rental Property

Can renters of property be expected to purchase the local loops that are physically connected to their (rented) property, and that can't follow them when their lease expires? It is helpful to answer this question separately for commercial and for residential tenants.

Commercial tenants often improve leased premises, although they know that those improvements stay with the property. The tenant might expect to recoup the cost of the loop when it sells its business, or it might consider the improvement to be another cost of doing business. Alternatively, the owner of commercial property might install loops as a means of attracting tenants who value those loops.

Residential tenants, on the other hand, typically do *not* bear the cost of improvements to their premises. In the case of residential rental property, is probably most reasonable for the property's owner to own the loops. This is unlikely to be a prohibitive cost, for multiple loops in a single building would likely cost far less than the same number of loops, one to a building. At the very least, the property owner could take advantage of time multiplexing, with no concern for joint ownership of parts of the loop. This is similar to the landlord's provision of electricity and plumbing in residential property: even if it is legal for a landlord to *not* provide this infrastructure, it clearly increases the value of the property to tenants when the landlord *does* provide it.

Is landlord (rather than customer) ownership of the local loops in multi-unit residential rental properties a recipe for creating a situation that is worse

than service provider ownership of the local loops? Will landlords use their ownership of the local loops to extract monopoly rent of their own? In areas with a moderate vacancy rate, one can expect the market to preclude this type of behavior: poor (or expensive) telecommunication would be treated as any other over-pricing of a good or service; tenants would move to buildings with better service or lower prices. In areas with a very low vacancy rate, on the other hand, regulatory oversight would probably be necessary to prevent overcharging for local loops–just as it would be necessary to prevent overcharging for stoves, or sinks, etc.

3.7. Loop Maintenance

Will customers be willing and able to maintain their local loops? Loop maintenance is not a trivial issue, but neither is it likely to be an insurmountable problem. On the one hand, loops do not wear out on a regular basis, because neither electrons nor photons cause wear to the wires or fibers over which they travel. On the other hand, underground loops may be damaged by careless digging, and overhead loops may be damaged by storms; how will such damage be repaired? If the damage is to the drop (the wire leading directly to the customer's premises), there is little difficulty: a customer can either repair the damage him- or herself, or the customer can hire a competent technician repair the damage.[51]

[51] This is no different, in principle, from how people repair their cars, or their computers, or other complex equipment.

However, if the damage is in the feeder or distribution network, where the loops of many tens or hundreds of customers are wrapped in a single sheath, there is potential for catastrophe. An unskilled person could cause damage to *all* of the other loops in the sheath, while trying to fix a single loop–clearly, this must be prevented. Another situation with potential for catastrophe is when all (or many) loops in a feeder or distribution wire are damaged (this is a common case when damage is caused by a storm, for example): if there are 3,600 pairs of wires in a sheath, might a different repair person have to splice each of the 3,600 pairs?

In order to avoid catastrophe in a situation such as one of the above, it would be prudent to require that all customers whose loops travel in a common sheath be maintained by the same company. This could be implemented by requiring that the loop construction company that installed the loops also maintain them, or by contracting them all to a single maintenance company.[52] Loop maintenance companies would also be required to employ trained and competent (perhaps even licensed) service technicians–just as telephone companies do, today.[53]

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[52] This should not constitute a barrier to customer ownership; it is comparable to providing a warranty for a new car. If loop construction is a competitive industry, loop construction companies might choose to provide warranties on loops–serviced by a single company, of course–even if there were no potential problems such as those described in the text.

[53] Clearly, if customers own their local loops and are free to choose from a variety of loop types, loop standards will be necessary to ensure the continued interoperation of the telephone network. This is an issue that has been dealt with many times, as the telephone industry has become unbundled. There are already standards for customer premise equipment (CPE)–the local loop could be considered an extension of CPE.

4. Summary and Conclusions

For competition in telephony in telephony to succeed, several difficult problems must be solved. These include interconnection among local exchange carriers, interconnection between local exchange and interexchange carriers, and the transition to competition. In the case of interconnection among LECs, it is necessary to determine a fair price for that interconnection. In the case of interconnection between LECs and IXCs, it is necessary to apportion the costs that are common to the provision of local and interexchange service, and that are not traffic sensitive, among the LECs and IXCs. In the case of the transition to competition, it is necessary to determine to what extent, and for how long, regulatory oversight of the industry is required, and when, if ever, competition can take its place. This paper has shown that customer ownership of the local loop provides a straightforward, integrated solution to these problems. In addition, customer ownership of the local loop can create a competitive, demand-driven loop construction industry.

This paper has also discussed seven potential problems with customer ownership of the local loop. It has concluded that each problem is either not severe, or is not particular to customer ownership of the local loop. In particular:

1. The cost of constructing local loops is not, on the average, exorbitant. Therefore, the cost of customer ownership of the local loop should not be exorbitant, either. Of course, customers pay the cost of their loops whether they own them or not.

2. Customer ownership of the local loop is unlikely to further complicate the problem of universal service. In fact, by making the major cost of telephone service explicit, it may simplify the implementation of universal service.
3. If customers must purchase their local loops, they may choose not to purchase their *current* local loops. The best way to deal with this possibility is to provide the incumbent with the incentive to sell its existing local loops.
4. It is possible–perhaps likely–that incumbents will argue that mandating customer ownership of the local loops amounts to an unconstitutional taking of their property. In the current judicial climate, however, this argument is unlikely to succeed.
5. An increasing number of local loops (about 10% of loops in the U.S., in 1991[54]) include a portion that is time-multiplexed among many customers. There are several models for joint ownership of common property, any one of which is straightforwardly applicable to local loops.
6. It is unclear whether renters should, or would want to, own their local loops. In some cases, it is probably more appropriate for a landlord to own the local loops of his or her tenants; in other cases, tenants would probably choose to own their local loops.
7. Customers may be frightened of maintaining a long piece of wire, about which they know very little. However, maintenance of a customer owned local loop

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[54] Waring, D.L., J.W. Lechleider and T.R. Hsing. 1991. "Digital Subscriber Line Technology Facilitates a Graceful Transition from Copper to Fiber." *IEEE Communications Magazine* 29(3), p. 97.

could easily be included in a contract with the builder of that loop, or with some other company with the necessary expertise.

Thus, not only does customer ownership of the local loop provide an integrated solution to the major problems of competition in telephony, but it also does not appear to be subject to any fatal flaws. Therefore, customer ownership of the local loop is a plausible strategy for implementing competition in telephony.

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