Chapter 2

Bringing Competition to Telecommunications by Divesting the RBOCs*

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1. INTRODUCTION

The road to competition in telecommunications has been a long one and, despite the major technological advances in microelectronics, wireless and optical fiber, the industry is only partially competitive. In this paper we argue that the main barriers to competition are the Regional Bell Operating Companies (RBOCs) as they control the bottleneck of access to the local wireline network. The Telecommunications Act of 1996 (the 96 Act) attempted to change this by allowing RBOCs into long-distance, provided they opened up their networks to competitors. This has proved to be very difficult to do because of the nature of the local networks and the problems of interconnections to them. These problems have meant that the competitors known as "Competitive Local Exchange Carriers" (CLECs) have not been able to compete on equal terms with the RBOCs. As the RBOCs were the gatekeepers, the CLECs were always concerned that absent regulation, the RBOCs would gouge them with high prices and that even with regulation the

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RBOCs would sabotage their operations. In this paper we revisit this problem, which has been of considerable interest in the literature and in regulatory proceedings. In particular, we argue that the bottleneck, sabotage and monopoly issues are such that divestiture by the RBOCs of their local networks, albeit a very drastic step, currently is the most promising approach to making the industry more competitive relative to the main alternatives under consideration, namely, the *status quo,* the creation of fully separated subsidiaries (but wholly owned by the RBOCs) and to lifting all regulation of RBOCs, namely *laissez-faire.*

The paper proceeds in section 2 by stating the problem. It goes beyond the background and summary of existing work on sabotage and economies foregone and discusses the welfare tradeoffs. Section 3 provides a simple model of sabotage that extends a model developed by Weisman and Kang (2001), henceforth, WK. The principal result is that divestiture is welfare enhancing absent major losses in economies of scope. Section 4 sets out our proposal and examines some issues of practical implementation. Section 5 is by way of summary and implications. An appendix provides a proof of the major proposition on divestiture.

2. BACKGROUND AND STATEMENT OF THE PROBLEM

Following the Bell System Divestiture in 1984 (the 1984 Divestiture), which separated AT&T from its local operating companies, the industry has undergone major change, including some considerable technological advances and new forms of competition especially from wireless. The long distance market became intensely competitive as a result of the 1984 divestiture, which was its intent. Long distance competition resulted from equal access and balloting. We should note here that, in this context, equal access provides effectively identical use of the local network by Long Distance Carriers to connect to their customers. Such equal access has not taken place for local exchange competition. The 1984 Divestiture was not designed to result in local competition. That was left to the 1996 Act. However, the networks owned and operated by the RBOCs, although they have been substantially upgraded and have benefited from technological advances, have remained a bottleneck, a monopoly in effect. RBOCs assert that significant competition exists. It is true that competition exists from wireless. However, there is minimal competition from other wireline technologies. The competition from cable that appears to be the main plank of C. Michael Armstrong's vision for a vertically integrated competitor to the RBOCs' fixed networks has not yet materialized Despite powerful pleas

by the RBOCs and others, for example, Danner and Wilk (2003), we find it hard to characterize the RBOCs' networks otherwise than a bottleneck, a monopoly. They have similar properties to electricity distribution networks. Just as the RBOCs face competition from wireless networks, so do electricity distribution networks face competition from gas distribution networks in the energy market. In the case of electricity, gas and local telecommunications regulation of price, terms and conditions of service exists primarily because of significant monopoly power. In the case of wireless there are several operators and competition appears to be vigorous, almost certainly too vigorous for the operators' tastes. Moreover, wireless operators in addition to providing some competition with local access provide more competition for long distance service. Indeed, the competition from wireless is such that the distinction between local and long distance has now blurred. Arguments by the RBOCs to the effect that their networks should no longer be regulated have been considered carefully by regulators and generally but not universally rejected. While the recent FCC "Triennial Review" decision appears to have changed the regulatory landscape regarding CLEC access to the RBOC's local network, it did not deregulate the market for local telephone service.

We are proceeding on the basis that the RBOCs have a monopoly in their local networks and will therefore be subject to regulation, essentially the situation that has prevailed since 1996 but has much longer roots. We therefore see RBOCs as fully vertically integrated suppliers of telecommunications services who are obliged by regulatory authority to provide access to their networks to CLECs. This situation confers huge advantages on the RBOCs relative to the other carriers that rely on access to the local network. This advantage is *per se* a major problem when it comes to competition. If one firm has great advantages relative to another, then the situation is the basic structure of a natural monopoly, implying great difficulties when a competitive solution is sought. These advantages drive our argument for divestiture of the RBOCs' local networks in that divestiture puts all players on equal terms but with possible loss of economies of scope. If, in addition to these advantages, the RBOCs are also in a position to sabotage, discriminate against or otherwise disadvantage rivals then the case for divestiture is even stronger.

For some time there has been a concern in practice and in the regulatory economics literature as to whether vertically integrated providers (VIPs) like the RBOCs have an incentive to discriminate. For example, Economides (1988), Mandy (2000) and Weisman (1995), WK have studied this situation at some length. Mandy provides a summary and analysis of the state of the debate including a critical review of the assumptions employed by the

participants of the debate. WK, (p125) summarize the results of their analysis as follows.

> *Discrimination always arises in equilibrium when the vertically integrated provider (VIP) is no less efficient than its rivals in the downstream market, but it does not always arise when the VIP is less efficient than its rivals.* Numerical simulations that parameterize the regulator's ability to monitor discrimination in the case of long-distance telephone service in the U.S. reveal that *pronounced efficiency differentials are required for the incentive to discriminate not to arise in equilibrium.*[1] [Emphasis added]

Based on this, raising rivals' costs through discrimination or sabotage clearly cannot be rejected. Reiffen and Ward (2003, p39-40) argue that "...well-established economic principles indicate that a regulated monopolist with an affiliate in an unregulated business may have an incentive to deny the affiliate's competitors access to an 'essential' input, or more generally, degrade the quality of service of the input supplied to the competitors." CLECs have always argued that the RBOCs have discriminated against them putting them at a severe disadvantage. Crandall (2001) has argued that RBOCs have received only a very small number of complaints. Mini (2001) argued that the RBOCs prior to 1996 were more cooperative to CLECs than was the old GTE.[2] Similarly, Reiffen and Ward (2003) is supportive of the hypothesis that RBOCs discriminate. RBOCs, while arguing that they do not discriminate, have provided evidence to the effect that they treat CLECs' orders for service differently from their own internally generated orders. Indeed, one of their augments is that if they were forced to form separate subsidiaries, let alone divest their networks, that they would face a dramatic increase in their costs arising from a change in ordering system.[3] Thus, there seems to be reasonable grounds to suspect that RBOCs treat CLECs differently at least with respect to processing their orders relative to

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[1] As Dennis Weisman has noted, this assumes no quality of service penalties and parity provisions that may temper the incentive for sabotage.

[2] Recall that the old GTE was allowed to enter the long distance market essentially unrestricted while the RBOCs were not. Since 1996 the RBOC situation has been more similar to that of the old GTE. It may not be unreasonable to infer that their behavior might change bringing the "new" RBOCs behavior more closely aligned to that of the old GTE.

[3] For instance, in a current proceeding in California, SBC argues that dire consequences will result if it is forced to form a fully separate subsidiary and is forced to use non-integrated ordering systems. SBC claims that "such integrated processes are more cost efficient than...contracting with a separate network company for services," (Palmer, Reilly and Cartee 2003, page 7).

internally generated orders and that the differences between the two systems are significant as admitted by SBC. The issue is whether this different treatment constitutes sabotage or raises CLECs' costs. This is potentially an important issue as there are considerable deadweight losses associated with sabotage. By contrast the literature has concentrated on the incentives to discriminate while ignoring the welfare economic effects. We attempt, partially at least, to remedy this with our model in section 3.

3. A BASIC MODEL OF SABOTAGE AND WELFARE

We employ the basic Cournot model of WK, but add features that are essential for a welfare analysis. We focus only on the duopoly case in which there is a vertically integrated incumbent V and a single entrant E. V provides both an essential access good, priced at a regulated price w to E, as well as a complementary good, bundled with access. We assume some economies of scope across the bundled stages of production for V in that the unit cost of providing the access good is assumed to be $c + e$ for E and c for V, where $e \geq 0$.

We define welfare in the usual manner, incorporating the additional costs of regulatory oversight.

$$W(w,\delta) = \int_0^Q P(q)dq - P(Q)Q + \Pi_V + \Pi_E - C_R(\delta) \qquad (1)$$

where the inverse demand curve P(Q) is given by

$$P(Q) = A - BQ \qquad (2)$$

The regulatory monitoring function $C_R(\delta)$ is some convex, increasing function of regulatory precision $1/\delta$, where δ is defined as "...the maximum percentage distortion in the independent rival's complementary cost that [V] can affect without certain detection by the regulator."(WK, p129)

The VIP's profits Π_V are given by

$$\Pi_V = (w - c - e)q_E + (P(Q) - c - s_V)q_V - C_V(s_E - s_{0E}) \qquad (3)$$

where $C_V(s)$ is the cost to V of effecting discriminatory access policies to E, with

s_V = V's unit cost of the complementary good

s_E = unit cost of the complementary good for the entrant E after actions by V that may increase this unit cost

s_{0E} = initial unit cost of the complementary good for the entrant E (or the cost before distortion by V)

Thus, $s_E - s_{0E} \geq 0$ is the contrived unit cost increase resulting from V's possible sabotage or other type of discriminatory access policies. Note that these cost increases affect E, but they also require expenditure by V of $C_V(s_E - s_{0E})$ to effect.

The entrant's profits Π_E are given by

$$\Pi_E = (P(Q) - w - s_E)q_E \tag{4}$$

The following constraints are imposed on the magnitude of V's effect on E's cost of the complementary good:

$$s_{0E} \leq s_E \leq (1+\delta)s_{0E} \tag{5}$$

As in WK, we can easily compute the asymmetric Cournot equilibrium outcome, which is identical to that of WK, for the case n = 2, i.e.

$$q_V = \frac{1}{3B}[A - 2(c + s_V) + w + s_E] \tag{6}$$

$$q_E = \frac{1}{3B}[A - 2(w + s_E) + c + s_V] \tag{7}$$

Total demand and price are given by:

$$Q = q_V + q_E = \frac{1}{3B}[2A - c - s_V - w - s_E] \tag{8}$$

$$P(Q) = A - BQ = \frac{1}{3}[A + c + s_V + w + s_E] \tag{9}$$

Given the above, there are several cases that could be computed. These include solutions to the following problems:

First-Best, Welfare-Optimal Solution: Solve for all decision variables $(w, \delta, q_V, q_E, s_E)$ to maximize Welfare in (1).

Cournot-constrained Welfare-Optimal Solution: Solve for the decision variables (w, δ, s_E), with q_V and q_E determined by the Cournot solution, so as to maximize W. Think of this solution as the outcome resulting from nearly perfect regulation (the Regulator can set both δ and s_E, the latter subject to (5)), where the outcome in the market is known to everyone to be determined by Cournot-Nash interactions between V and E.

Cournot-constrained, Profit-maximizing Welfare-Optimal Solution: Solve for the decision variables (w, δ) with q_V, q_E determined by the Cournot solution and s_E determined by V so as to maximize V's profits at the Cournot solution. This is the outcome of a boundedly rational regulator who must expend resources to monitor discriminatory behavior (as embodied in the cost function $C_R(\delta)$) and who knows that the outcome in the market will be determined by V and E as Cournot, with V rationally expecting this outcome and setting s_E so as to maximize V's profits at the resulting Cournot outcome.

To obtain the Cournot-constrained, Profit-maximizing Welfare-Optimal Solution, we need to solve for the profit-maximizing s_E, given a Cournot-Nash outcome. Substituting the Cournot-Nash equilibrium solutions given above into V's profit function, we obtain:

$$\Pi_{VC} = \left(\frac{w-c-e}{3B}\right)\left[A - 2(w+s_E) + c + s_V\right] + \left(\frac{P(Q)-c-s_V}{3B}\right)\left[A - 2(c+s_V) + w + s_E\right] - C_V(s_E - s_{0E}) \tag{10}$$

where $P(Q)$ is given as the Cournot-Nash price in (9) above. Substituting for $P(Q)$ from (9), it is easily seen that (10) is strictly concave in s_E. Thus, the optimal solution to maximizing Π_{VC} in (10) subject to the linear constraint set (5) as characterized by the first order necessary conditions, is found. To make the intuition clear in what follows, let us consider the following functional specifications for C_V and C_R:

$$C_V(s) = as^2, \text{ for some } a > 0; \qquad C_R(\delta) = \frac{b}{0.1+\delta}, \text{ for some } b > 0 \tag{11}$$

C_R is a decreasing function of δ. Thus, as δ increases, regulatory precision $(1/\delta)$ decreases. With C_V given in (11), a bit of algebra on the first

order necessary conditions for maximizing (10) yields the following profit-maximizing solution s^*_E to maximizing Π_{VC} in (10) subject to (5):

$$s^*_E = Min[Max(\hat{s}_E, s_{0E}), (1+\delta)s_{0E}] \tag{12}$$

where δ is regulatory precision, as set by the regulator, and where

$$\hat{s}_E = \frac{2[A - 2(c + s_V) + w] - 6[w - c - e] + 18aBs_{0E}}{18aB - 2} \tag{13}$$

where we assume that $9aB > 1$, so that the denominator in (13) is always positive. We note that when $w \leq c + e$, (13) implies that $\hat{s}_E > s_{0E}$ whenever $q_V(s_{0V}, s_{0E}) > 0$. Thus, at the Cournot solution, sabotage is optimal for V under very general conditions.

We can now summarize the basic results for the three problems examined here.

P1. First-Best, Welfare-Optimal Solution: Solve for all decision variables $(w, \delta, q_V, q_E, s_E)$ to maximize Welfare. The solution here is easily shown to satisfy the following conditions:

1. Regulatory precision δ should be set to the least costly level possible i.e. to minimize $C_R(\delta)$ in (11);
2. No contrived cost inflation should occur: $s_E = s_{0E}$;
3. The least costly producer between V and E (which will be V if and only if $c + s_V \leq c + e + s_{0E}$) should produce total industry output;
4. Access price should be $w = 0$, and end-to-end price should be set to the marginal cost of the least costly producer.

P2. Cournot-constrained Welfare-Optimal Solution: Solve for the decision variables (w, δ, s_E), with q_V and q_E determined by the Cournot solution (6)-(7), so as to maximize W. The solution here is also easy to obtain and satisfies the following conditions:

1. Regulatory precision δ should be set to the least costly level possible;
2. No contrived cost inflation should occur: $s_E = s_{0E}$;
3. Access price should be:

$$w^* = Max[2c + 6e + 5s_{0E} - 4s_V - A, 0] \tag{14}$$

Here we would expect some loss in welfare relative to First Best because Cournot competition leads to non-zero profits and non-marginal cost pricing,

but still we would expect to see no wasted effort in distorting costs, and this is true.

P3. Cournot-constrained, Profit-maximizing Welfare-Optimal Solution: The Regulator sets the decision variables *(w,* δ*)* with q_V, q_E then determined by the Cournot solution and s_E determined by V according to (12)-(13), i.e. so as to maximize V's profits at the Cournot solution. In this case, as expected from WK, V does find it optimal to drive up its rival's cost. A tradeoff ensues for both V and the Regulator, in that it is costly for V to drive up E's costs, and it is costly for the Regulator to monitor V so as to mitigate the contrived cost increases inflicted on E. Interestingly, the Regulator uses the access price w to partially correct for the excess profits generated at Cournot equilibrium for both V and *E.* By decreasing access price, especially in the case in which V is more efficient than E, the Regulator can, in effect, drive E's costs down through decreasing access price, and can move the resulting Cournot-Nash equilibrium towards more efficient industry-wide pricing and output. In the process, some of V's profits are, of course, sacrificed as *w* is set below cost *(c + e)* to provide E access.[4]

Table 1 below shows the base case values for the numerical examples and Table 2 shows the solutions to problems P1, P2 and P3 above. We provide two solutions to P2 and P3. The first of these P2a-P3a does not restrict the range of the access price w; the second P2b-P3b restricts w to be no lower than V's cost of providing the access good to E *c + e.* Interestingly, the former case provides higher welfare under both the assumptions of P2 and P3. The reason is simple. The Regulator can increase the Cournot industry output by decreasing *w* (see (8)), sacrificing V's profits in the interest of increasing industry output and decreasing price. If the Regulator is able to control industry output through adjustment of the price instrument "w", then it is efficient to do so. Indeed, even if V's profits are constrained to be non-negative (see case P3a below), a price of $w = 0$ can be the most efficient non-negative price when the Regulator anticipates that Cournot competition between V and E will determine the ultimate market price of the bundled good.

Table 1: Parameters for Base Case

A	B	Sv	C	e	a	b	s0E
1000	*5*	200	*100*	*20*	*0.4*	200	*180*

[4] The idea of setting the price of access below cost is not original to us; for example, Mandy (2001) and Panzar and Sibley (1989).

Table 2: Illustrating Base-Case Results

	Case P1a	Case P2a	Case P2b	Case P3a	Case P3b
w	120.00	0.00	120.00	0.00	120.00
δ	1.000	1.000	1.000	0.015	0.020
s_E	180.00	180.00	180.00	182.73	183.62
Π_V	0.00	-44.44	10888.89	61.50	10982.78
Π_E	0.00	19635.56	10888.89	19408.45	10664.99
q_E	0.00	63.00	47.00	62.00	46.00
q_V	140.00	39.00	47.00	39	47.00
P(Q)	300.00	493.33	533.33	494.24	534.54
W	48818.18	45080.4	43373.74	43312.11	41647.81

Note that δ in our examples is constrained to be no greater than 1, so that $\delta = 1$ is the most relaxed, i.e. least costly, regulatory oversight of potential discriminatory behavior. For example, P1 a is the First-Best Solution, while P2a is the welfare-optimal solution when the Regulator is constrained to Cournot outcomes after setting *w,* δ and s_E. P2b is the same as P2a, except here the Regulator requires V to sell access at no lower than marginal cost *(c + e)*. P3a and P3b are the (more realistic) outcomes associated with allowing V to raise E's costs, subject to the endogenous regulatory constraint (5), with δ set by the Regulator to maximize welfare, given the anticipated discrimination of V and the cost of controlling it. Comparing P1 with P2b and P3b, we see that welfare, output and the magnitude of sabotage $(s_E - s_{0E})$ move in the expected direction, following the results recorded above.

Now let us consider a final approach to the problem above, that of divestiture. In this case, a separate firm, denoted D (for divested firm) takes over the assets of V associated with producing the access good, leaving the former firm V with only assets for the upstream or complementary good, which competes directly with E. The profits of the divested access firm, Π_D, are defined as[5]:

$$\Pi_D = (w - c - e)(q_E + q_V) - C_D(s_V - s_{0V}) - C_D(s_E - s_{0E}) \qquad (15)$$

[5] Note that we that V no longer has a cost advantage relative to E in integrating with its former parent division, now the divested firm D, in the sense that the provision of access carries a constant marginal cost for both V and E of *c + e*. We maintain the cost disadvantage "e", now applying to both V and E, in order to do a welfare comparison with the undivested case.

where $C_D(s)$ enjoys the same properties as C_V (e.g., is of the form (11) with $s = s_E - s_{0E}$), and where the entrant E and the now upstream divested division of V make profits (compare with (3) and (4))[6]:

$$\Pi_{VD} = (P(Q) - w - s_V)q_V \tag{16}$$

$$\Pi_{ED} = (P(Q) - w - s_E)q_E \tag{17}$$

Assuming as before that V and E compete in Cournot-Nash fashion, we obtain from (16)-(17) the following Cournot outcomes:

$$q_{VD} = \frac{1}{3B}[A - 2s_V - w + s_E] \tag{18}$$

$$q_{ED} = \frac{1}{3B}[A - 2s_E - w + s_V] \tag{19}$$

Total demand and price at the Cournot equilibrium are then given by:

$$Q_D = q_{VD} + q_{ED} = \frac{1}{3B}[2A - 2w - s_V - s_E] \tag{20}$$

$$P(Q) = A - BQ = \frac{1}{3}[A + 2w + s_V + s_E] \tag{21}$$

These results lead to the following problem:

P4. Cournot-constrained, Profit-maximizing Divested Solution: The Regulator sets the decision variables (w, δ) to optimize welfare (see (23) below) with q_V, q_E then determined by the Cournot solution (18)-(21), where D chooses s_V and s_E to maximize (15) subject to:

$$s_{0F} \le s_F \le (1 + \delta)s_{0F}, \quad F \in \{E, V\} \tag{22}$$

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[6] Note that we assume that V is no longer in a position to raise E's costs and therefore no longer incurs any costs itself in this regard.

where welfare is defined as:

$$W_D(w,\delta) = \int_0^{Q_D} P(q)dq - P(Q)Q_D + \Pi_{VD} + \Pi_{ED} + \Pi_D - C_R(\delta) \qquad (23)$$

Table 3 below provides results for the base case of Table 1 for the Divested model. For comparison purposes, we restrict attention to the case in which $w \geq c + e$ is required, so that the access good is not subsidized. Thus, the column "Case P3, e = 20" repeats the results of Table 2 above for Case P3b). The columns "Case P4, e = n" reflect the results of maximizing (23) subject to (22) and the constraint $w \geq c + e$. Comparing P3 with P4, we see the expected result that welfare is increased when moving to divestiture. Of course, if the access cost difference "e" for divested and undivested access were high enough, then divestiture would not be welfare enhancing.[7] This implicit assumption and argument of our paper is that e is not sufficiently large to undermine the welfare benefits of our divestiture proposal.

These numerical results illustrate the following general conclusions for this case.

1. Subject to the breakeven constraint $\Pi_D \geq 0$, the welfare-optimal access price, given Cournot competition between V and E, is $w^* = c + e$.

2. From (15), we see that as long as access price w is set no lower than c + e, so that D can earn non-negative profits, the divested firm D will no longer find it worthwhile to increase either E or V's costs (i.e., the left-hand inequality in (22) holds for both E and V at optimum), as this would simply depress E or V's output and therewith D's profits. This occurs because D has no downstream operations and therefore has no downstream profits at stake.

3. Assuming that D and its predecessor vertically integrated V are both required to make non-negative profits on access, i.e. when $w \geq c + e$ is imposed, welfare is increased in the divested case relative to the undivested case for e sufficiently small.[8]

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[7] For the base case data of Table 1, the critical value of e* = 28.61. For values less than e* divestiture is welfare enhancing, and for values greater than e* divestiture decreases welfare.

[8] The proof requires the mild additional requirement that the vertically integrated firm V produces non-zero output at the Cournot equilibrium when no cost distortion occurs, that is when $s_F = s_{0F}$, for F = V, E in (6).

Table 3: Illustrating the Results of Divestiture on Welfare (Subject to the Constraint that $w \geq c + e$)

	Case P3 e=0	Case P3 e=20	Case P4 e=0	Case P4 e=20
w	100.00	120.00	100.00	120.00
δ	0.018	0.020	1.00	1.00
s_E	183.30	183.62	180.00	180.00
s_V	200.00	200.00	200.00	200.00
Π_V	10361.13	10982.78	10275.56	9680.00
Π_E	11952.89	10664.99	12168.89	11520.00
q_E	49.00	46.00	49.33	48.00
q_V	46.00	47.00	45.33	44.00
P(Q)	527.77	534.54	526.67	540.00
Π_D	NA	NA	0.00	0.00
W	42924.24	41647.81	44667.07	42178.18

Concerning the last point, a proof of this assertion is included in the Appendix. One first shows the intuitive fact that, subject to the constraint $w \geq c + e$, the optimal solution for both P3 and P4 obtains at $w = c + e$, i.e. there is no rationale for the regulator to increase access prices beyond marginal cost in this model. Next, one shows directly from (1) and (23) that, at $w = c + e$, welfare under divestiture is greater than under vertical integration for e sufficiently small. The noted claim results.[9]

The model and the simulations of this section, along with the discussion of section 1 indicate that there are potentially serious problems with a structure involving a VIP in the midst of a group of competitors. Cases P1-P3 provide a number of insights on the difficulties of attaining the benefits of competition in the case where there is a monopoly VIP. Some of the solutions are going to be difficult to achieve in practice. While, as shown in Table 2 (P2a-P3a), it may be possible to improve efficiency by forcing down the VIP's access price below cost, this is not likely to be acceptable and has not proved so. Given, the advantages conferred upon the VIP, it seems that *laissez faire* would lead to one supplier, like the old days of the integrated Bell System. The alternative is to promote competition in those parts of the telecommunications value chain where it seems to be viable and ensure competitors' access to the monopoly network on equal terms. Thus, to make the telecommunications competitive, some minimal monopoly may have to

[9] Using the values for the simulation as reported in Tables 1-3, $e < 28.61$ would result in Divestiture being preferred.

be accepted with regulation still playing a major role in the future of telecommunications.

4. NATURE OF THE DIVESTITURE

The 1984 Divestiture was executed through a court approved Plan of Reorganization (POR). The separation of monopoly "local" facilities from competitive "long distance" facilities was consummated through the POR. The 1984 Divestiture, along with the subsequent equal access and balloting, led to a vigorous competitive long distance market. This contention is supported by the FCC's non-dominance finding for AT&T, and similar findings by state commissions. The 1984 Divestiture achieved its goal.

As expected, the 1984 Divestiture did not lead to effective competition in the local market. Since the 1984 Divestiture the seven RBOCs and GTE have consolidated into four ILECs. SBC absorbed Pacific Telesis and Ameritech as well as little SNET, which was not an RBOC. Verizon absorbed NYNEX, Bell Atlantic and GTE. BellSouth and Qwest remain essentially unchanged by consolidation with other ILECs. All of the RBOCs, except Qwest, have major interests in wireless. Indeed, this is the only area in which they effectively compete against one another. While the 1984 Divestiture was not designed to deliver a competitive local market, the 96 Act was expressly intended to achieve that result.

The 96 Act immediately gave the RBOCs the opportunity to compete for long distance customers outside their regions but they did not do so. This, in itself, is testimony to the power of the VIP. The VIP, no doubt, understood the dangers of opening the door to freewheeling competition to other powerful companies, namely, fellow RBOCs. In addition, they were presumably aware of the difficulties of competing where they did not own the local network. Under our proposal each of these monopolies would be split into two independently owned companies, a wholesale network company (NetCo) and a retail company (Retail Company). The NETCO would be a wholesale only entity providing services only to other carriers. These Carriers Carriers (CCs) would be regulated and provide no retail services. Their only customers would be retail telephone carriers. While the details require considerable attention we sketch below how the industry would now be organized including the nature of the regulation.

The argument for divestiture of the RBOCs can be understood in the context of the question "should airlines own airports?" In the case of the airline industry, the monopoly element is the airport with its concourses, gates, air traffic control and runways (the literal "last mile"). The competitive airline carriers invest in their planes, ticket ordering systems and retail marketing but they obtain shared equal access to the runways and air

traffic control system from third parties. No one to our knowledge has proposed allowing an airline to own all (or any) commercial airports.[10] In the case of the RBOCs under our proposal, the network would be divested from the retail sales, marketing, billing and customer service.

The policy goal would be to obtain the benefits of competition and efficient use of bottleneck facilities. The RBOCs currently use two sets of OSSs (operating Support Systems) to process service requests. First are the internal OSSs that support the vertically integrated operations of the RBOC retail sales organization. Second is the "wholesale" OSSs established to process CLEC service requirements. Under our proposal, the RBOC would choose which set of OSSs would be used uniformly after divestiture. After divestiture, the NETCO would use the same OSSs to serve all CLECs, including the new Retail Company formed in the divestiture.

The Retail Company would (in general) retain the administrative buildings, CRIS billing system (end-user billing), retail sales and marketing organizations and systems, as well as wireless operations and facilities. NETCO would retain all central office and outside plant facilities and buildings (except for the wireless assets noted above), CABs billing system, and wholesale marketing support. There are two choices regarding "long distance" facilities. Such facilities can either be left with the NETCO, or separated using the same rules as the 1984 Divestiture POR. That choice can be made by the agency supervising the divestiture. Our preference is to leave the long distance facilities with the Retail Company so that the NETCO could provide wholesale LD capabilities to its carrier customers. Since much of the existing RBOC long distance service is provided through resale of other long distance carriers' wholesale services, this is likely to be a smaller issue than during the 1984 Divestiture.

The NETCO would remain initially regulated. As CLECs (including the new Retail Company) make new network investments, state PUCs should evaluate NETCO's market power. As network elements are duplicated and lose their status as bottleneck facilities, the degree of regulation should be reduced. The PUC could choose either classic Rate Base/Rate of Return regulation or price-cap regulation or some combination including earnings sharing. NETCO would retain the interconnection and unbundling obligations of the former RBOCs. NETCO would gain a new enthusiasm for selling UNEs to carriers, since that would become its principal source of revenue. CLECs would be less concerned about UNE pricing since all would be clearly and transparently treated the same.

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[10] Even with this ownership safeguard, competition is not guaranteed in the airline industry. Certain hubs are, indeed, dominated by one carrier.

The regulation of the Retail Company after Divesture would be quite different from that of the NETCO. One possibility would be not to regulate it in any way, as it no longer controlled bottleneck facilities. However, given that it would initially have a market share of over eighty per cent there may be some concern about market dominance. Some transitory oversight regulation may therefore be in order. This could be similar to the manner in which AT&T was regulated after the 1984 Divestiture. Since the Retail Company would no longer control bottle-neck facilities, its form and degree of regulation should be reduced over a period of time that is expected to be shorter than the 10 years it took AT&T to be declared non-dominant by state and federal regulators. The Retail Company would have no statutory resale obligations. However, we expect that as the Retail Company comes to understand that it has no market power (assuming that is the case), it would actively seek resale opportunities.

Divestiture of the RBOCs should lead to benefits similar to the divestiture of the Bell System. Whichever OSSs are selected by NETCO, they will be applied to all interconnecting carriers on the same non-discriminatory basis, which is not the current case. Two OSS systems mechanically allow for a set of discriminatory schemes limited only by imagination. The opportunity for discrimination begins with design differences and can be a simple as staffing choices (i.e., quality of staffs). If there is an incentive to discriminate, then the existence of two systems provides the means to implement such discrimination. In practical experience, harm can be imposed via limits on volume, time to process, unexplained rejects, and errors in processing (for example, installing a digital loop w/o testing prior to turn-over). Because the opportunity for discrimination is limited by imagination, this list of examples is illustrative, not comprehensive.

The effective difference between the RBOCs' internal OSS and the systems designed for CLECs are documented in the filings made by CLECs. The significance of those differences are documented in SBC's filing with the California PUC opposing separation. In that filing, SBC admitted that its integrated system was more efficient than the OSS made available to CLECs. The fact that there are two separate systems makes it impossible for both systems to be equally effective and efficient. When all retail carriers face the same costs and processing quality to process an order and provide service, concerns regarding discriminatory treatment, sabotage and price-squeeze will be ameliorated or eliminated. Prior to divestiture, each RBOC has superior access to the network than does CLECs. That condition is eliminated in divestiture.

The competitive pressure of multiple retail carriers having the same access to the network will lead to innovation and lower costs. NETCO's

"largest" customer will initially be the Retail Company, but all vendors in any market have a largest customer. NETCO will find incentive to serve all of its customers well. The relationship between NETCO and its customers will be external and arm's length. Regulators will have an easier time ensuring non-discriminatory treatment. The NETCO will have the creative ideas of multiple customers as a resource (all of the CLECs), rather than the ideas of just one retailer (the centralized planning of the RBOC). [11]

5. CONCLUDING DISCUSSION

The debate on the structure and regulation of telecommunications will certainly continue. Our aim in this paper has been to propose a solution that is at the same time radical but has also been tried and tested with the 1984 Divestiture. The RBOCs, as they are currently structured, are increasingly like the vertically integrated Bell System. The major difference is that, in contrast to the old Bell System, they have lawful local competitors who are at a disadvantage because they have to use the RBOCs' bottleneck facilities. Our initial attempts at modeling and simulation have indicated that maintaining the vertically integrated structure is problematical. One possible approach is for the incumbent to sell access to the entrants at below cost. This is obviously something that the incumbent will oppose and it will encourage sabotage. This is the situation that the incumbents currently claim they face while categorically denying practicing sabotage.

By contrast divestiture, based on our analysis, is likely to be efficiency enhancing and may lead to real competition in that all the competitors compete on equal terms. Bringing about the "New Divestiture" may be difficult. It took years for the Government's case against AT&T to be resolved with the 1984 Divestiture. There is currently no litigation of equivalent magnitude against the RBOCs. What is going on is more akin to trench warfare. The RBOCs and the CLECs have entrenched positions. To the extent that state regulatory commissions reduce the payments for UNEs, or UNEPs or require the formation of fully separate subsidiaries the impact will become more unfavorable on the RBOCs, who may then decide that Divestiture makes sense or is the lesser of two evils. Their management and their shareholders might then find the idea of a NETCO and a Retail Company more attractive as it would be more difficult for regulators to set NETCO prices in a non-compensatory manner and the Retail Company

[11] As Dennis Weisman remarked to us, at least historically, divestitures can increase the market value of the companies divested. The governments attempt to punish John D. Rockefeller succeeded only in making him a much wealthier man!

formed from the former RBOC would still be the dominant player with its large market share as well as significant assets in wireless and broadband. While notionally the Retail Company would compete on equal terms in practice it would have numerous advantages over the others. If the RBOCs were to recognize these benefits relative to the *status quo* they would conceivably even initiate Divestiture.

For now we may be voices crying in the wilderness. None of the major players, like AT&T, have embraced our proposal. Other like Reiffen and Ward (2003) and Faulhaber (2003), while showing concern for the problem of sabotage by the RBOCs, have held back from arguing for the New Divestiture. Faulhaber seems to believe that it would not provide sufficient benefits and that technological change will eventually resolve most of the problems. Reiffen and Ward are concerned about the loss of scope economies. We have serious doubts that they are significant. Indeed, to us it seems likely that capital markets will do a better job than management in allocating resources and the history of management excesses in over-expansion by American business supports this view. If Reiffen and Ward are correct and there are significant scope economies then even absent sabotage the ultimate solution will be for the RBOCs to become monopolists again like the old AT&T. The RBOCs would counter by arguing that their resulting monopoly would not be like that of the old AT&T. They would contend that significant competition would exist from cable and from wireless. Given the trend to consolidate wireless, which may include RBOC takeover of wireless companies thereby reducing the competition in wireless. What could occur is a duopoly - with the RBOCs dominating wireline and wireless and with cable companies offering telephony. The direction the duopoly would take is not clear. Cable companies might attempt to acquire wireless companies so that they would be able to compete with the RBOCs in offering a full range of broadband, wireline and wireless.

The choices may be a duopoly in the form suggested (with likely increasing dominance on the part of RBOCs, or collusion) or a divested wires-only wholesale carrier providing a competitive check on the cable entities. In the latter case there would be the possibility for many competitors to buy NETCO's services including cable operators where they did not have cable operations. Clearly we have a preference for the latter as we expect the potential for significant and widespread competition in telecommunications to be limited in the other cases. It may therefore be better to limit the monopoly to a divested carriers' carrier as we propose than to allow the monopoly power of the monopolists to continue to grow as the competitors are whittled away by sabotage.

APPENDIX

The purpose of this appendix is to demonstrate the validity of the assertion made in the text concerning P4, which we formulate in the Proposition below. We first note two lemmas, the proof of which is straightforward.

Lemma 1: The solution to maximizing W_D in (23) at the Cournot solution (18)-(21) subject to $w \geq c + e$ entails $s_{0F} = s_F$, for $F \in \{E, V\}$, so that no sabotage is optimal in the divested problem subject to a breakeven constraint.

As noted in the text, Lemma 1 follows immediately by noting that if D drives up the cost of either E or V, it will simply result in decreased output at the Cournot equilibrium (18)-(19), lowering D's profits as given in (15).

Lemma 2: Assume that $q_V(s_{0V}, s_{0E}) > 0$ when $e = 0$ and $w = c$ (i.e., the Cournot solution (5) entails positive output for V when $e = 0$, $w = c$, and $s_F = s_{0F}$, for $F \in \{E, V\}$). Then the solution to maximizing W_D in (23) at the Cournot solution (18)-(21) subject to $w \geq c$ exceeds that of maximizing W_V in (1) at the Cournot solution (6)-(9) subject to $w \geq c$. Moreover, under the same conditions ($e = 0$ and $w = c$), $s^*_{EV} > s_{0E}$, sabotage occurs at the Cournot-Constrained Welfare Optimum (problem P3).

The proof of Lemma 2 follows directly from noting first that (when e = 0) maximizing either W_D or W_V subject to $w \geq c$ obtains at $w = c$. Using this together with (1) and (23) then yields, after some algebra, the desired result.

The following Proposition notes our main result concerning sabotage.

Proposition: Assume that $q_V(s_{0V}, s_{0E}) > 0$ when $e = 0$ and $w = c$. Then, for e > 0 sufficiently small, the solution to maximizing W_D in (23) at the Cournot solution (18)-(21) subject to $w \geq c+e$ exceeds that of maximizing W_V in (1) at the Cournot solution (6)-(9) subject to $w \geq c+e$.

The proof of the proposition proceeds as follows. We first note that at $w = c$ and $e = 0$, any feasible $(\delta_V, q_V, q_E, s_V = s_{0V}, s_E)$ satisfying (5)-(7) and (12)-(13) also satisfies (18)-(19) and (22). Thus, at optimum, we must have $W_D \geq W_V$. Actually, however, strict concavity of W_D in w and δ and the linearity of the constraint set (18)-(22) implies that strict inequality must obtain, i.e. $W_D > W_V$, if the solutions to maximizing W_D and W_V (at $w = c$, $e = 0$) are not identical. Noting the above Lemmas 1 and 2, sabotage occurs under regime V and does not occur under regime D, so that, in fact, the solutions are not identical under the noted conditions. We see therefore that $W_D > W_V$ when $e = 0$. But since the optimal solution is unique (under both regimes), we know that the optimal solution is continuous in e. Clearly, therefore there exists a neighborhood around $e = 0$ for which $W_D > W_V$ continues to obtain, as asserted.

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