

an ILEC's investment prospects by "raising the bar" by which all expected returns are measured.

II. THE EFFECT OF MANDATORY UNBUNDLING ON THE CLEC'S INVESTMENT DECISION

A. Optimal Entry Delay

50. The uncertain success of any technology gives imitators an advantage over innovators when regulators mandate unbundling at TELRIC prices. By requesting unbundled elements, the CLEC can always "keep its powder dry" and unbundle the ILEC's successful technology choice. In that manner, mandatory unbundling confers a "second-mover" advantage and substantially decreases a CLEC's incentives to make a sunk investment, an effect that has been investigated in the recent academic literature on innovation and real-option theory.⁶⁷

Indeed, one CLEC, Intermedia, has recognized that fact in its 1999 SEC filings:

Utilizing leased facilities enables Intermedia to (i) meet customers' needs more rapidly; (ii) improve the utilization of Intermedia's existing network; (iii) add revenue producing customers before building out its network, thereby *reducing the risks associated with speculative network construction or emerging technologies*; and (iv) subsequently focus its capital expenditures in geographic areas where network construction or acquisition will provide a competitive advantage and clear economic benefit.⁶⁸

67. See Aron, Dunmore & Pampush, *supra* note 8; DIXIT & PINDYCK, *supra* note 11. For an application of option theory to investment in telecommunications, see Hausman, *Valuing the Effect of Regulation on New Services in Telecommunications*, *supra* note 8.

68. See INTERMEDIA COMMUNICATIONS INC., 1999 SEC FORM 10-K, at 8 (1999) (emphasis added).

Simply put, CLECs have the freedom to choose between investing today in sunk equipment embodying uncertain technology or delaying that investment until more information becomes available and reduces that uncertainty.

51. In telecommunications—with leapfrogging innovations and fundamentally different competing technologies—the decision to invest today (rather than to delay investment) is particularly risky, as it often commits the CLEC to a particular technology that may reveal itself later to be an inferior one. Investments in telecommunications technology also face uncertainties about market demand, competition, and the associated costs. The history of telecommunications offers many examples of firms that squandered substantial market opportunities by investing either too early or too late.⁶⁹

52. Without mandatory unbundling, a CLEC would have to balance delay against the potential loss of a first-mover advantage. Through early investment, a CLEC could serve markets before other CLECs or ILECs in complementary markets could deploy networks. With mandatory unbundling, however, the payoff to swift action diminishes, as such outlays can only confer transitory rewards. A compulsory-sharing regime tips the balance of the CLEC's calculus in favor of waiting. The value of the first-mover advantage erodes, and the value to the CLEC of keeping its options open increases. If hindsight confirms that the ILEC chose to invest in the correct technology, then the CLEC can simply demand to unbundle the ILEC's facilities at TELRIC prices.

69. For example, AT&T introduced Picturephone too soon. *See, e.g.*, www.djvu.att.com/djvu/att/archives.

53. The option value of mandatory unbundling at TELRIC prices can lead the CLEC to prefer unbundling to building facilities, even if building facilities has a higher net present value. One CLEC, Focal Communications, admits in its SEC filings that it can shift risk onto the ILEC by exploiting the option to unbundle:

The Company's strategy of leasing rather than building its own fiber transport facilities results in the Company's cost of service being a significant component of total costs. The Company has to date been successful in negotiating lease agreements which match the duration of its customer contracts, thereby allowing the Company to avoid the risk of continuing expenses associated with transmission facilities that are not being used by revenue generating customers.⁷⁰

Moreover, if each CLEC expects other CLECs to reason in the same manner, the incentive to delay investment is amplified. Stated another way, as soon as a particular CLEC commits to an investment in a particular technology, that CLEC is no longer protected by its second-mover status. Other CLECs may benefit by waiting for a superior technology to emerge.

B. The Possibility of Regulatory Gaming

54. Mandatory unbundling of network elements at TELRIC prices creates incentives for a CLEC to game the regulatory system. One plausible strategy that CLECs (and their IXC parents or strategic partners) could employ is to demand a perfect, "bug-free" version of the ILEC's back-office systems and operations support systems (OSS) before considering entry. Because most CLECs and IXCs have new OSS and back-office computer systems, requests for UNEs by those firms can place heavy burdens on the ILEC's older computer systems and da-

70. See FOCAL COMMUNICATIONS CORP., 1999 SEC FORM 10-K, at 11 (1999).

tabases. An ILEC has invested large amounts in upgrading its legacy systems and training employees.⁷¹ Nonetheless, some IXCs claim that the current system is still plagued by errors.⁷² Three years after the enactment of the Telecommunications Act, not a single RBOC has received permission to begin offering consumers in-region interLATA service. It would be naïve to ignore that such delay can be increased through regulatory gaming by CLECs—whose owners and strategic partners, the IXCs, have a strong incentive under the competitive checklist process of section 271 to characterize any problem in the ILEC's network as evidence that its local exchange markets are closed to competition.

55. Before an RBOC undergoes scrutiny under the checklist, it first must enter into an interconnection agreement, approved by the state public utilities commission in the state where the RBOC seeks to originate interLATA calls, with a facilities-based provider of local exchange service.⁷³ Then the FCC, in consultation with the relevant state public utilities commission (PUC), will determine whether the RBOC's interconnection agreement satisfies the fourteen requirements of the checklist.⁷⁴ If the interconnection agreement passes the checklist, and if the RBOC has established a structurally separate entity for the provision of in-region

71. See, e.g., Raymond W. Smith, *Smoke Detection: Clearing the Air on Local Competition*, in *IS THE TELECOMMUNICATIONS ACT OF 1996 BROKEN? IF SO, HOW CAN WE FIX IT?* 25 (J. Gregory Sidak ed. AEI Press 1999) (describing OSS compliance at Bell Atlantic).

72. See, e.g., John Zeglis, *Out of the Courts and Into the Market: Wouldn't It Be Great?*, in *id.* at 100 (describing AT&T's complaints about RBOC provision of OSS).

73. 47 U.S.C. § 271(c)(1)(A). Alternatively, if the state PUC approved a generic interconnection plan offered by the RBOC but the RBOC received no request for interconnection within the first seven months after enactment of the Telecommunications Act of 1996, then the RBOC may proceed to be evaluated under the checklist. *Id.* § 271(c)(1)(B).

74. *Id.* § 271(c)(2)(B).

interLATA service,⁷⁵ then the FCC, after consulting with and giving substantial weight to the views of the Department of Justice,⁷⁶ must rule, under the general public interest standard of the Communications Act, on the RBOC's request to provide in-region interLATA service.⁷⁷

56. Although the FCC must approve or reject the RBOC's application within ninety days, the complexity of the checklist and the related approval process will inevitably produce disputes on matters of fact, law, economics, and engineering. That complexity—along with the provision authorizing the FCC to suspend or revoke its approval of the RBOC's provision of in-region interLATA service and the related provision creating a process for the filing of complaints by private parties upon which the FCC must act within ninety days⁷⁸—creates a rich opportunity for strategic gaming by IXC's and CLECs seeking to block RBOC entry into long-distance markets. The experience with the MFJ is suggestive. The MFJ allowed for modification of its line-of-business restrictions through a waiver process. That process proved to be a quagmire that was costly in terms of delaying benefits to consumers in the form of greater price competition and new service introductions. By 1993 the average age of pending waiver requests before the Department of Justice was thirty-six months, despite the fact that the DOJ had opposed relief in only six of the 266 waiver requests filed by the RBOCs.⁷⁹ By the end of 1993 the average age of pending waiver motions before the district court had grown to 54.7

75. *Id.* § 272(b).

76. *Id.* § 271(d)(2)(A).

77. *Id.* § 271(d)(3).

78. *Id.* § 271(d)(6).

79. Paul H. Rubin & Hashem Dezhbakhsh, *Costs of Delay and Rent-Seeking Under the Modification of Final Judgment*, 16 *MANAGERIAL & DECISION ECON.* 385, 385-86 (1995).

months, despite the fact that the court had approved in full 96 percent of all waiver requests filed.⁸⁰

57. Viewed in these terms, it is not surprising that the Commission has not approved a single section 271 application since the passage of Telecommunications Act of 1996. The process of construing and applying the checklist fuels esoteric regulatory proceedings and litigation. Because the outcome of such proceedings and litigation will determine when an RBOC will be allowed to compete in lucrative interLATA markets, one would therefore expect the IXCs, and the CLECs controlled by them, to contest those proceedings and litigation fiercely. The competitive checklist has become “regulation’s rendition of *Waiting for Godot*.”⁸¹ The likely result of the FCC’s ordering of mandatory unbundling of OSS and other information-based assets at TELRIC prices would be to slow the section 271 approval process even more.

C. Diminished Provision of “Traditional” Services Using Innovative Means

58. In the face of mandatory unbundling at TELRIC prices, CLECs will be less inclined to develop innovative ways to provide service. For example, innovations are being developed to permit the provision of POTS over DSL lines without the use of any circuit-

80. *Id.* at 389, 392.

81. See PAUL W. MACAVOY, *THE FAILURE OF ANTITRUST AND REGULATION TO ESTABLISH COMPETITION IN LONG-DISTANCE TELEPHONE SERVICES* 176 (MIT Press & AEI Press 1996).

switching apparatus.⁸² CLECs will have less incentive to pursue those technologies if they can require the ILEC, through “spectrum unbundling,” to provide the POTS service, especially if the ILEC is compelled to provide that service below cost because of rate regulation and social-pricing concerns.

59. Without spectrum unbundling, CLECs have an incentive to add voice service to DSL—either by investing in voice switching or by developing voice-over-DSL protocols. Innovation and investment would therefore be higher in the absence of spectrum unbundling. In early 1999, Commissioner Powell warned that mandatory unbundling may diminish the CLEC’s incentive to offer “traditional” service using new means: “While mandating access can bring about short-term improvements in retail competition, it also may undermine incentives for developing new methods to circumvent the influence of incumbents over distribution.”⁸³

60. Also, as noted by Commissioner Powell in the *Second Further Notice of Proposed Rulemaking*⁸⁴ and by Justice Breyer in *Iowa Utilities Board*,⁸⁵ the incentives for a CLEC in such a regulatory framework encourage its overdependence on unbundling and its underinvestment in facilities-based competition. Commissioner Powell observed that “unconstrained access would eviscerate incentives for entrants to install their own facilities and thereby inhibit the type of competition most likely to spur innovation, provide price discipline and otherwise

82. See *Jetstream Offers CLECs Affordable Entry into Small Business*, COMMUNICATIONS TODAY, Dec. 8, 1998; 3COM PRESS RELEASE, “End-to-end ADSL: Solutions for Deployable ADSL Services” (www.teledotcom.com/strategies/xdsl3com.html); PARADYNE CORPORATION, THE DSL SOURCE BOOK, *supra* note 39.

83. See *Advanced Services Report*, *supra* note 58 (statement of Commissioner Powell).

84. See *SFNPRM*, *supra* note 4 (statement of Commissioner Powell).

benefit consumers.”⁸⁶ The FCC should scrutinize the CLECs’ strategic incentives when designing the optimal policy of mandatory unbundling pursuant to section 251(d)(2).

III. FURTHER DISTORTIONS OF THE INVESTMENT DECISION CAUSED BY THE COMMISSION’S MANDATORY UNBUNDLING RULES

61. In the following sections, we show how the possibility of mispriced UNEs aggravates the disincentives to invest in innovation efforts. We also demonstrate how mandatory unbundling will eliminate or greatly reduce procompetitive bundling opportunities for ILECs that would redound to the direct benefit of consumers. Finally, we argue that the Commission should endeavor to solve the commitment problem associated with its discretion to mandate the unbundling of additional network elements at TELRIC prices in the future.

A. The Relation between Retail Rates and Costs Affects the CLEC’s Entry Decision

62. The possibility of mispriced UNEs further reduces the incentives to invest in innovation efforts. A conflict arises if UNEs are available at TELRIC prices while resale rates are calculated on the basis of avoided-cost discounts applied to retail rates.⁸⁷ In cases where retail rates are below costs, especially in rural and low-density service areas, CLECs will rationally choose to use resale rather than lease unbundled network elements at TELRIC prices, thus obtaining wholesale service considerably below cost. That effect drastically reduces the

85. See *Iowa Utilities Board*, 119 S. Ct. at 754 (Breyer, J., concurring in part and dissenting in part).

86. See *SFNPRM*, *supra* note 4 (statement of Commissioner Powell).

87. See *SIDAK & SPULBER*, *supra* note 8, at 308, 335–37.

ILEC's incentive to engage in innovation and the CLEC's incentive to enter a particular geographic market as a facilities-based competitor. By contrast, the CLEC's ability to bypass wholesale rates in areas where retail prices exceed costs reduces the CLEC's incentives to invest in facilities.⁸⁸ That is particularly important in locales where particular rates (often, for business service) are maintained artificially high by regulatory fiat.

B. Input Unbundling Eliminates Procompetitive Output-Bundling Opportunities that Would Benefit Consumers

63. Mandatory unbundling will eliminate or greatly reduce procompetitive bundling opportunities for ILECs that would redound to the direct benefit of consumers.⁸⁹ Bundling of outputs is attractive if a new service is most cost-effectively marketed and most convenient to the end-user when combined with an existing service. For example, many ILECs currently offer POTS bundled with DSL service at an attractive price and include an Internet service provider (ISP) for a nominal charge. Thus, some customers are able to purchase all three of those services from an ILEC for a single price. This bundling advantage is being threatened by AT&T, which announced plans in 1998 to bundle POTS, long-distance service, cable television service, cable modem, and ISP offerings all for one price:

88. As Justice Scalia, writing for the Court in *Iowa Utilities Board*, noted: "Because this universal-service subsidy is built into retail rates, it is passed on to carriers who enter the market through the resale provision. Carriers who purchase network elements at cost, however, avoid the subsidy altogether and can lure business customers away from ILECs by offering rates closer to cost. This, of course, would leave the ILECs holding the bag for universal service." 119 S. Ct. at 737.

89. It has long been noted that bundling can have procompetitive or efficiency-enhancing effects in markets subject to rapid technological innovation. *See, e.g.,* J. Gregory Sidak, *Debunking Predatory Innovation*, 83 COLUM. L. REV. 1121 (1983).

AT&T intends to pursue local entry by transforming the cable footprint of one-way cable plant into a two-way, broadband network capable of meeting the full spectrum of communication needs of the residential customer. AT&T intends to deploy a variety of services over the upgraded cable plant, including a richly featured "all-distance" (i.e., local, long distance, international) voice telephony offering. AT&T plans to use existing circuit-switched technology to pilot telephony service offers over the cable plant beginning in 1999. However, AT&T expects to begin to transition to an integrated Internet protocol (IP) packet data architecture by the end of 2000 that affords cost and feature benefits over the older circuit-switched technology.⁹⁰

Mandatory spectrum unbundling would eliminate the ILEC's opportunity to offer bundled one flat-rate residential service and DSL service. Such regulatory intervention would make it harder for ILECs to match the bundled services that sophisticated rivals like AT&T intend to will likely offer in the marketplace. Despite this perverse consequence for competition and consumer welfare, the FCC is pursuing mandatory spectrum unbundling in the *Advanced Services Further Notice of Proposed Rulemaking*.⁹¹

64. Mandatory spectrum unbundling would decrease the ILEC's incentive to develop innovative technical solutions that facilitate bundling, such as splitterless DSL. It would also decrease incentives for CLECs to compete in residential telephony. Instead of unbundling the entire loop, CLECs would simply pursue the most profitable advanced-services portion of the customer's demand. That digital cream-skimming would not necessarily increase competition in residential voice telephony; rather, it would more likely siphon off to CLECs the most lucrative opportunities among the most attractive customers of the residential market. Moreo-

90. See AT&T CORP., 1998 SEC FORM 10-K, at 15 (1999).

91. See *Advanced Services FNPRM*, *supra* note 41. The California legislature is similarly considering such a policy in A.B. 991. See *supra* note 41.

ver, in the process the CLECs would not be developing the customer service and other intangible assets that are required to be successful local exchange carriers. In short, mandatory spectrum unbundling would preclude (at least in the short-term) the possibility of ILECs competing for the advanced-services market.

C. The Commission Should Solve the Commitment Problem Associated with Its Discretion to Unbundle Additional Network Elements in the Future

65. Economic theory recognizes that commitments made in bargaining situations influence the behavior of other actors only to the extent that the person making such commitments is credibly bound (by himself or others) to honoring them.⁹² The notion of enforceable agreements plays a similar role in regulated industries as it does in competitive markets. As Pablo T. Spiller and others have shown, both theoretically and empirically, that the level of investment in long-lived infrastructure undertaken by a regulated (or recently privatized) public utility depends critically on regulatory institutions' having been designed to ensure the credibility of the regulator's commitments that it will not act opportunistically once the utility has placed those nonsalvageable assets into service.⁹³

92. See, e.g., OLIVER E. WILLIAMSON, *THE MECHANISMS OF GOVERNANCE* 120-44 (Oxford University Press 1996); PAUL MILGROM & JOHN ROBERTS, *ECONOMICS, ORGANIZATION AND MANAGEMENT* 131 (Prentice Hall 1992); OLIVER E. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING* 167 (Free Press 1985); THOMAS C. SCHELLING, *THE STRATEGY OF CONFLICT* (Oxford University Press 1960).

93. Pablo T. Spiller, *Institutions and Regulatory Commitment in Utilities' Privatizations*, 2 *INDUS. & CORP. CHANGE* 387 (1993); Brian Levy & Pablo T. Spiller, *The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Five Country Studies of Telecommunications Regulation*, 10 *J.L. ECON. & ORG.* 201 (1994); Shane Greenstein, Susan McMaster & Pablo T. Spiller, *The Effect of Incentive Regulation on Infrastructure Modern-*

66. The FCC's interpretation of the "necessary" and "impair" standards ultimately leads to a choice of which network elements shall be unbundled. For any well-defined geographic market, the Commission's framework will result in one of four classifications for each network element:

- (1) the element will be unequivocally within the set of elements to be unbundled;
- (2) the element will be unequivocally outside the set of elements to be unbundled;
- (3) the element will be just within the set of elements to be unbundled; or
- (4) the element will be just outside the set of elements to be unbundled.

The first two classifications may be regarded as *inframarginal* cases, and the latter two classifications may be regarded as *marginal* cases. Economics teaches, of course, that consumers and firms make decisions at the margin. An ILEC considering whether to invest in a technology that relies on a network element in the fourth category would rationally forgo that investment if there were a significant risk that regulators would later reclassify the element as one subject to mandatory unbundling at regulated, cost-based rates. To the extent that the risk of regulatory reclassification is significant, the incentive problem extends not only to network elements that the FCC currently subjects to mandatory unbundling, but also to any network element for which it might be technically feasible for the FCC *in the future* to order mandatory unbundling at a TELRIC price.

ization: Local Exchange Companies' Deployment of Digital Technology, 4 J. ECON. & MGMT. STRATEGY 187 (1995).

67. There are several ways in which a network element that “just passed the test” might eventually be reclassified as being subject to mandatory unbundling at a TELRIC price. First, any standard adopted by the Commission will incorporate several exogenous characteristics that will likely change over time. For example, suppose the FCC embraced an efficient-competitor standard for mandatory unbundling that incorporated the extent of competition in the supply of the requested element. Suppose further that the number of distinct suppliers of the requested element in a well-defined geographic market decreased as the result of a consolidation or a decision to exit the industry. When applied at a later date, the efficient-competitor standard might reclassify the requested element such that the ILEC would then be ordered to unbundle that element at a TELRIC price.

68. Second, the application of any regulatory standard that relies on empirical data is subject to measurement error. To continue the earlier example, suppose that the Commission’s standard required the level of competition for the supply of the network element to meet some threshold, t^* . Suppose that the Commission (or the state PUC) must measure the actual level of competition for the supply of that element, t , which is randomly distributed from 0 to 100.⁹⁴ Suppose further that the Commission (or the state PUC) measures the actual level of competition with error, such that the Commission’s estimate of competition is $t + e$, where e is a random error term that ranges from -10 to 10. Assume that the Commission declares that the network element should *not* be unbundled at the present time (that is, the actual level of

competition surpasses the target level, t^* .) The ILEC can only infer from such a decision that the actual level of competition, t , ranges from t^*-10 (if the error term was -10) to 100 . Assuming the Commission's subsequent measurement of competition is just as accurate as its first attempt, the probability that the Commission will reclassify the network element in the subsequent round of examination is substantial.⁹⁵

69. Given the significant likelihood that a network element that the FCC originally considered off-limits may eventually be unbundled, either through measurement error or through a change in exogenous variables underlying the test, the Commission should adopt an appropriate commitment mechanism to encourage investments in network elements subject to this risk of regulatory reclassification. The Commission should outline its position regarding network elements *conditional on the first application of its impairment test* in the present remand proceeding. To all elements that are originally unbundled at TELRIC prices, the Commission should apply a sunset provision that would (1) remove the element from the set of network elements subject to mandatory unbundling and (2) place the burden on the CLEC to prove that an absence of competitive conditions for end-user telecommunications services requires regulators to continue to mandate unbundling of the element at a TELRIC price. The mandatory unbundling of obligations for the ILEC's elements should sunset after the passage of

94. For example, the Commission may attempt to measure the Herfindahl-Hirschman Index (HHI) of concentration in the switching market by calculating shares as a function of switches sold. In that case, the range of the competitive index would be from 0 to 10,000.

95. The probability that the UNE would be reclassified can be calculated by summing the probabilities that $t + e$ is less than t^* given that t ranges from t^*-10 to 100 . Assuming (1) both variables are uniformly distributed, (2) e is independent of t , and (3) $t^*=75$, the probability would be 28 percent.

two years or upon the entry of a facilities-based competitor of the stature of AT&T, MCI WorldCom, or Sprint, whichever occurs first.

70. For those elements for which the Commission (or the relevant state public utilities commission) does *not* initially mandate unbundling at TELRIC prices, the Commission should announce a “rising competitive benchmark” by which those elements would be tested in the future. Suppose, for example, that the Commission adopted a consumer-welfare standard that asked whether the ILEC could exercise market power in the end-user services market by restricting access to a given network element. Upon the first application of the test, the Commission (or state PUC) would assess whether, in a particular geographic market, the ILEC’s restriction of CLEC access to the element at a TELRIC price would allow the ILEC to raise prices in the end-user services market by *five* percent. Conditional upon the element not being unbundled at a TELRIC price in the first regulatory iteration, the Commission (or state PUC) would assess, in its second iteration, whether denying CLECs unbundled access to that network element at a TELRIC price would allow the ILEC to raise prices in the end-user services market by *ten* percent. Because it is less likely that an ILEC could sustain a ten-percent price increase (relative to a five-percent increase), the probability would greatly diminish that regulators would reclassify the element as being subject to mandatory unbundling at a TELRIC price.

71. Suppose, alternatively, that the Commission embraced a competitor-welfare standard that asked whether a CLEC could profitably produce the service given the ILEC’s

restriction of unbundled access to the network element in question.⁹⁶ In its first application of the test, the Commission (or state PUC) could assess whether a CLEC could earn a *fifteen* percent rate of return without having access to the requested element at TELRIC prices.⁹⁷ Again, conditional upon the regulator's not ordering the ILEC to unbundle the element at a TELRIC price, in its second application, the Commission (or state PUC) would assess whether a CLEC could earn a *ten* percent rate of return without having access to the requested element at a TELRIC price. An increasing competitive benchmark would credibly commit the regulator to a policy of not reclassifying one of the ILEC's network elements after the regulator has initially determined that the element in question should not be subject to mandatory unbundling at a TELRIC price. Such a credible commitment by the Commission would maintain the proper incentives for the ILEC to continue making investments in the development and improvement of that element.

IV. THE EFFECT OF MANDATORY UNBUNDLING ON INNOVATION IN PARTICULAR NETWORK ELEMENTS

72. In the following sections, we describe recent innovations in switching, loops, DSLAMs, and transmission facilities. Mandatory unbundling at TELRIC prices would jeopardize continued innovation with respect to each of those recent developments.

96. We emphasize that the Commission should adopt a consumer-welfare standard rather than a competitor-welfare standard for interpreting section 251(d)(2).

97. One such profitable business plan might entail leasing the element from the ILEC at a voluntary rate in excess of TELRIC.

A. Switching

73. A number of voice-switching innovations, including more efficient routing tables and vertical features, should not be unbundled. Whether or not those innovations ultimately are deemed to be “proprietary,” they represent a substantial investment by the ILEC in embedded intellectual property for the creation of service enhancements. Similar concerns and negative implications arise with respect to the mandatory unbundling of data switching (such as ATM and DSLAMs).

74. First, these advanced switching services have not been as extensively deployed as competing technologies. For example, cable modems outnumber DSL modems. After AT&T’s acquisition of TCI, the CLEC that will provide the majority of cable modem service throughout the United States will be AT&T.⁹⁸ AT&T’s proposed acquisition of MediaOne would increase that dominance.⁹⁹

75. Second, the provision of business switched-data services is currently dominated by IXC’s, and the ILECs have only a miniscule share of this market segment. Frost & Sullivan reports that in 1997, the three largest IXCs (AT&T, MCI, and Sprint) accounted for 73.5 per-

98. See PAUL KAGAN ASSOCIATES, INC., CABLE TV TECHNOLOGY, *U.S. High-Speed Access Cable & ADSL Projection Model*, 1997-2006 (Feb. 28, 1998) (predicting that by 2003 over 12 million households (or over 10 percent of U.S. households) will subscribe to high-speed data service, and that three quarters of those households will obtain service through digital cable modems).

99. See Kathy Chen, Bryan Gruley & John R. Wilke, *AT&T-MediaOne Deal Is Likely: Complaints Involve Control Over Cable-TV Business And Pipelines to Internet*, WALL ST. J., May 6, 1999, at B11.

cent of such traffic.¹⁰⁰ Frost & Sullivan also reports that IXCs control over 90 percent of the market in certain advanced segments, such as ATM and frame relay.¹⁰¹ That evidence suggests that IXCs, not ILECs, are the dominant providers of services in this segment of the industry.

76. The FCC's suggestion that mandatory unbundling extend to packet switches raises troubling issues with respect to the Telecommunications Act's goals of fostering innovation and extending advanced telecommunications services: "It is the policy of the United States . . . to preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, unfettered by Federal or State regulation."¹⁰² Packet switches are the legitimate object of these expressions of legislative concern, for they are expected to be the foundation for delivering advanced telecommunications services. By definition, advanced services currently are services not widely deployed, for which the critical technology is advancing rapidly. The supply of those services is therefore fraught with technological risk. In many cases, the supply is yet to be created, as the assets need yet to be deployed. Therefore, we conclude that mandatory unbundling of switches at TELRIC prices would likely impose large social costs in the form of reduced investments. Such mandatory unbundling would not "reduce regulation," nor would it "encourage the rapid deployment of new tele-

100. See FROST & SULLIVAN, U.S. MARKETS FOR ATM, FRAME RELAY, SMDS AND X.25 PUBLIC DATA SERVICES 1-5 (1998) [hereinafter *SMDS Report*]. This category includes switched multimegabit data service (SMDS), ATM, and frame relay, as well as lower-speed services such as ISDN and X.25 service. *Id.* at 1-13.

101. See *id.* at 2-3.

102. See 47 U.S.C. §230(b)(2). The stated congressional purpose prefacing the Telecommunications Act is "to promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies." See Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, 56 (preamble).

communications technologies,”¹⁰³ as Congress intended through its enactment of the Telecommunications Act.

B. Loops

77. There is also a high potential for innovation in the area of loops, especially in the development of advanced broadband technologies such as DSL. Those areas include loop plant upgrades and conditioning (for example, bridge tap, dry join, and load coil removal), the implementation of DSLAMs at digital loop carrier (DLC) huts,¹⁰⁴ and the development of new and faster DSL protocols. Although interfaces are not *per se* proprietary to ILECs, they do reflect substantial development in trade secrets, such as engineering, installation, and troubleshooting techniques and methodologies.

78. In the presence of mandatory unbundling of the traditional loop, mandatory spectrum unbundling exacerbates the disincentive for investment. It currently is both cost-effective and feasible for CLECs to provide their own DSLAMs and switching equipment to provide both DSL and POTS over an ILEC’s unbundled “traditional” loops. For example, Paradyne has developed a DSL “starter kit” for extending service to as few as twenty subscribers over loops exceeding 20,000 feet.¹⁰⁵ Given the feasibility of unbundling the entire loop

103. *Id.*

104. DLC is “network transmission equipment used to provide pair gain on a local loop. The digital loop carrier system derives multiple channels, typically 64 Kbps voice-grade, from a single four-wire distribution cable running from the central office to a remote site.” See NEWTON, *supra* note 47, at 252.

105. Bob Metcalfe, *More from Maine’s rural MVL DSL front: Pick your speed and pay your toll*, INFO WORLD, July 13, 1998, at 4 (available at <http://www.infoworld.com>).

for use by the CLEC, and the given desirability of increasing competition in the local telephone market, the consumer benefits of mandatory spectrum unbundling are nonexistent. The only "benefit" of such a policy is captured by the CLEC and its shareholders, because the CLEC most likely would unbundle the entire loop if mandatory spectrum unbundling were not an option. In that sense, spectrum unbundling would be a classic case of asymmetric regulation: The CLEC would pursue the more profitable, unregulated service, while the ILEC would be left providing basic local service (in many cases, below cost). Innovation would be eroded by regulations that arbitrarily favored CLECs, without regard to the adverse effect of such asymmetric regulation on the welfare of consumers.

79. The Commission should reject mandatory spectrum unbundling outright because of its obviously deleterious effects on innovation. Such regulatory intervention would certainly reduce and possibly eliminate the current innovation occurring in loop technology, as well as reduce the market for small, entrepreneurial companies like Paradyne that are creating CLEC-tailored solutions to the provision of DSL and POTS over an unbundled loop. Indeed, once one accounts for the harmful effects that such an unbundling rule would have on the currently dynamic and competitive market for advanced services, the only reason to implement mandatory unbundling would be to enrich CLECs at the expense of ILECs and their ratepayers. Nothing in the Telecommunications Act authorizes the FCC to engage in such redistribution of income.

C. Digital Subscriber Lines Access Multiplexers

80. The *Second Further Notice of Proposed Rulemaking* raises the prospect of mandatory unbundling of DSLAMs.¹⁰⁶ Such a policy would harm the public interest. To understand why, it is instructive to review the recent developments in DSLAM technology. Some RBOCs are now experimenting with versions of DSL service that rely on high-frequency, high-power transmission over ordinary copper loops using asymmetrical data rates—such as asymmetric digital subscriber lines (ADSL), where the end-user’s download rate is much faster than the upload rate. In particular, some firms are experimenting with ADSL technology that does not require a splitter at the customer’s premises.¹⁰⁷ This technology is known as G.Lite, or “splitterless ADSL.”¹⁰⁸ Some analyst have criticized G.Lite as the “wrong” technology,¹⁰⁹ which appears to be inferior to alternative symmetric DSL solutions relying on other standards, such as Paradyne’s Hotwire multiple virtual lines (MVL) system.¹¹⁰ Although G.Lite is a public, nonproprietary standard, the consortium members are devoting considerable effort to the implementation of G.Lite in their networks. Such efforts include the deployment of G.Lite-

106. See *SFNPRM*, *supra* note 4, at ¶ 35.

107. A splitter “resides at both the [central office] and service user locations, allowing the copper loop to be used for simultaneous high-speed DSL data transmission and single line telephone service. POTS splitters usually come in two configurations—a single splitter version designed for mounting at the residence and a multiple splitter version designed for mass termination at the [central office].” See PARADYNE CORPORATION, *THE DSL SOURCE BOOK*, *supra* note 43.

108. For a general description of G.Lite technology, see Tim Greene, *Key DSL flavor faces big compatibility test, but G.Lite modem makers hope to achieve interoperability by June*, NETWORK WORLD, Apr. 19, 1999, at 1.

109. Bob Metcalfe, *Universal ADSL Working Group Is Speeding G.Lite Down a Road to Nowhere*, INFO WORLD ELEC., Sept. 7, 1998 (available at <http://www.infoworld.com>).

110. PARADYNE CORPORATION, *THE DSL SOURCE BOOK*, *supra* note 43, at 73.

compatible DSLAMs in central offices, training of installation personnel, development of loop selection and testing procedures, and OSS support.

81. If the Commission were to mandate the unbundling of DSLAMs, the attractiveness of G.Lite deployment would plummet. First, the ILEC would have to sell wholesale access to DSLAMs, which would dampen investment incentives in central office facilities. Second, the ILEC would be forced to share with other DSL operators the considerable investment in personnel training, installation procedures, and OSS support. Finally, the product differentiation that the ILEC is seeking through its ability to offer “splitterless” DSL service would be nullified. The provision of the splitter would entail an additional cost that the ILEC would have to charge to the customer. Consequently, the price-adjusted quality of the ILEC’s DSL service would diminish relative to the CLEC’s DSL service.

D. Transmission Facilities

1. Fixed-Link Innovations

82. Often CLECs provide competing loop services without using any regulated input from the traditional ILEC. For example, AT&T claims that half of its traffic from business customer terminates on its own network, a figure that is certainly higher after the company’s purchase of Teleport Communications Group in 1998.¹¹¹ Competing carriers encourage the use of their facilities through discounts or rebates for traffic either originating or terminating on

111. Statement by Frank Ianna, AT&T Data Services, *cited in* Stephanie N. Mehta & John J. Keller, *Sprint Plans to Integrate Voice, Data*, WALL ST. J., June 3, 1998, at A3.

proprietary networks, or through the use of special "on-net" tariffs. Any mandatory unbundling rule that facilitates a CLEC's ability to share the ILEC's innovations in fixed-link transmission would reduce the CLEC's incentive to invest in those types of proprietary networks. Government-induced disincentives to investment do not enhance consumer welfare and should not be regarded as advancing the public interest.

2. Wireless Innovations

83. Wireless carriers are experimenting with a wide range of wireless data services.¹¹² For example, Teligent has integrated point-to-point and point-to-multipoint wireless technologies with traditional broadband wireline technology. Teligent serves its customers by placing a small digital microwave antenna on the roof of a customer's building. It currently offers service in 24 markets that comprise more than 405 cities and towns with a combined population of more than 75 million.¹¹³ The company views changing consumers preferences and a favorable regulatory climate as key ingredients to its success:

We believe we are well positioned to capture revenues in the estimated \$128 billion business communications market. Our focus is on the estimated \$51 billion local exchange market, which is currently one of the most profitable segments in the communications industry. Local exchange services have historically been provided by regional monopolies known as incumbent local exchange carriers or "ILECs." ILECs have typically used older, existing copper wire-based networks. The ILECs' networks, faced with increasing demand from businesses for new services, such as Internet access, at reasonable costs, have

112. Traditional commercial mobile radio operators (including cellular, PCS, and specialized mobile radio) are increasing their deployment of next-generation wireless data services. *See, e.g.*, Eoin Licken, *New Data Age: Now, Portable Phones Aren't Just For Talking*, INT'L HERALD TRIB., Jan. 21, 1999, at ¶ 1. Other wireless carriers are also entering the fray. For example, Metricom, Ardis, and Ram are all offering a mobile wireless low-speed data service. Other carriers, such as Winstar, Teligent, and Teledesic, are offering fixed high-speed (DS-1 and above) services using land-based or satellite-based technologies.

113. *See* TELIGENT INC., 1999 SEC FORM 10-K, at 3 (1999)

created a “last mile bottleneck” between the customer location and the ILEC network switch. Our market research indicates that the ILECs have been unable to satisfy customer demands for cost-effective, flexible and responsive service and that a significant portion of Teligent’s target customer base—small and medium-sized businesses—is currently dissatisfied with its ILEC service. The potential revenue opportunity in this market, coupled with changes in the regulatory environment designed to enhance competition, have created opportunities for competitive local exchange carriers, or “CLECs,” such as Teligent. We intend to reduce or eliminate this last mile local bottleneck and gain market share primarily through the use of our SmartWave(TM) local networks while providing quality customer service and competitive pricing.¹¹⁴

Teligent’s strategy is suggestive of what other CLECs can do. Again, such investments in alternative technologies for access to the local network, which are already taking place *without* mandatory unbundling of the ILEC’s advanced services, would surely diminish in the face of more expansive mandatory unbundling rules.

CONCLUSION

84. Mandatory unbundling at TELRIC prices distorts the investment decision of ILECs. With respect to investments that decrease the marginal cost of an existing service, an invasive policy of mandatory unbundling undermines the ILEC’s incentive to maintain and upgrade its existing facilities. Mandatory unbundling of new services supported by new technologies is even more harmful to consumer welfare because it confers a valuable option on CLECs that can be exercised against the ILEC whenever the service and technology prove successful. It is disturbing that the Commission’s *Second Further Notice of Proposed Rule-*

114. *Id.* at 4.

making refers to “investment” or “innovation” only *once*.¹¹⁵ Investment, innovation, and product development are too central to consumer welfare in a high-technology industry such as telecommunications to be treated as an afterthought by the FCC.

85. Mandatory unbundling also raises the ILEC’s cost of capital, which serves as a benchmark of comparison for all expected returns. First, mandatory unbundling at TELRIC prices increases the cyclical nature of an ILEC’s profits and hence raises the ILEC’s systematic risk or beta risk. As a result, an ILEC’s investors would demand a larger risk premium because the firm’s stock would contribute more to the volatility of an investor’s overall portfolio. The larger risk premium would imply a higher cost of equity capital for an ILEC. Second, mandatory unbundling raises the uncertainty of an ILEC’s profits, increases the probability of its financial distress, and hence diminishes the ILEC’s ability to use debt financing. Because debt is a cheaper source of finance, the ILEC’s weighted-average cost of capital will rise.

86. Mandatory unbundling at TELRIC prices also adversely affects the CLEC’s investment decision. First, a compulsory-sharing regime tips the balance of the CLEC’s calculus in favor of waiting. The value of the first-mover advantage erodes, and the value to the CLEC of keeping its options open increases. Second, mandatory unbundling of network elements at TELRIC prices also creates incentives for a CLEC to game the regulatory system. Third, in

115. *SFNPRM*, *supra* note 4, at ¶ 3.

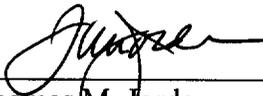
the face of mandatory unbundling at TELRIC prices, CLECs will be less inclined to develop innovative ways to provide service.

87. Other Commission policies exacerbate the perverse incentives that stem from mandatory unbundling at TELRIC prices. In cases where retail rates are below costs, especially in rural and low-density service areas, CLECs will rationally choose to use resale rather than lease unbundled network elements at TELRIC prices, thus obtaining wholesale service considerably below cost. Mandatory unbundling will also eliminate or greatly reduce procompetitive bundling opportunities for ILECs that would redound to the direct benefit of consumers. Finally, the Commission should credibly commit itself to maintaining the proper incentives for the ILEC to continue making investments in elements that would be at risk of being unbundled at TELRIC prices in the future.

88. In assessing whether a particular interpretation of section 251(d)(2) would enhance consumer welfare and thus serve the public interest, the Commission should recognize that any regulation that mandates the unbundling of network elements at regulated prices can severely distort investment, product development, and innovation in the telecommunications marketplace. If some mandatory unbundling is good, it does not at all follow that more is better for purposes of serving the public interest. Mandatory unbundling has costs as well as benefits, and the *Second Further Notice of Proposed Rulemaking*, by ignoring that tradeoff, fails to give investment and innovation the solicitude that the public interest standard requires. Congress directed the FCC in section 251(d)(2) to consider, "at a minimum," the "necessary" and "impair" standards when deciding whether to mandate unbundling of particular network

elements at regulated prices. The “something more” that the Commission should consider, beyond the statute’s minimum concerns, is the harm that mandatory unbundling at TELRIC prices would impose on consumer welfare by discouraging investment, innovation, and product development.

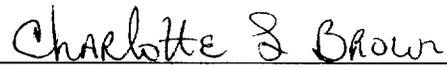
I declare, under penalty of perjury, that the foregoing is true and correct, to the best of my knowledge and belief. Executed on May 25, 1999.



Thomas M. Jorde

Washington
District of Columbia

On this the 25th day of May, 1999, before me, Charlotte L. Brown, a Notary Public for the District of Columbia.



Notary Public

4-30-03

My commission expires

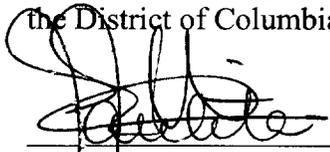
I declare, under penalty of perjury, that the foregoing is true and correct, to the best of my knowledge and belief. Executed on May 25, 1999.


J. Gregory Sidak

Washington
District of Columbia

On this the 25th day of May, 1999, before me,
the District of Columbia.

, a Notary Public for

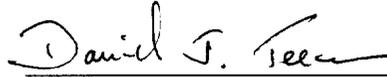


Notary Public

PAULITA F. ROSS
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires October 12, 1999

My commission expires

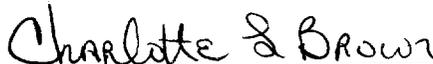
I declare, under penalty of perjury, that the foregoing is true and correct, to the best of my knowledge and belief. Executed on May 25, 1999.



David J. Teece

Washington
District of Columbia

On this the 25th day of May, 1999, before me, Charlotte L. Brown, a Notary Public for the District of Columbia.



Notary Public

4-30-03

My commission expires

