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33 Bill and Keep at the Central Office As the Efficient Interconnection Regime

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Executive Summary

This paper proposes a unified approach to interconnection pricing called Central Office Bill and Keep ("COBAK"), which applies to all types of carriers that interconnect with, and to all types of traffic that pass over, the local circuit-switched network. COBAK is a *default* interconnection regime, which means it would apply only when two networks cannot agree on terms for interconnection.

The COBAK proposal consists of two rules for local calls involving two networks. First, a called party's carrier cannot charge an interconnecting carrier to *terminate* a call. (Thus, each carrier recovers the cost of the loop and local switch from its own end-user customers). Second, the calling party's network is responsible for the cost of transporting a call between the calling party's central office and the called party's central office. These rules are easily extended to calls involving both local exchange and interexchange carriers.

COBAK will solve or ameliorate many of the significant problems that plague the existing interconnection regimes. First, COBAK eliminates various regulatory arbitrage opportunities that beset the current interconnection regime, including the current preferential treatment of Internet Protocol ("IP") telephony compared with traditional, long-distance service, and the "ISP reciprocal compensation" problem. Second, by eliminating termination charges, COBAK significantly reduces the "terminating access monopoly" problem, which gives even the smallest carrier monopoly power over calls that terminate with its customers. Third, by eliminating inefficiently structured interconnection charges, which carriers tend to flow through to end-user prices, COBAK is likely to result in more efficient end-user prices and more efficient network usage. Finally, COBAK reduces the need for regulatory intervention, both initially and as competition develops in telecommunications markets.

The paper also addresses various implementation issues raised by COBAK. Among other things, the paper discusses the issue of identifying central offices under COBAK and possible incentives created by COBAK to locate central offices inefficiently. The paper also discusses certain cost recovery issues arising from the fact that, under COBAK, carriers will recover the cost of termination from their end users. The paper proposes various alternative solutions to these problems.

I. INTRODUCTION

1. The Telecommunications Act of 1996 ("1996 Act")[1] envisions competitive, deregulated telecommunications markets, in which services are provided by multiple complementary and competing interconnected networks. Unfortunately, the existing patchwork of interconnection regimes, which are based on such historical, regulatory distinctions as local vs. long-distance, interstate vs. intrastate, and basic vs. enhanced,[2] was not designed for competitive and deregulated telecommunications markets, and may not facilitate the efficient development of competition in telecommunications markets. Moreover, the existing interconnection regimes may not be sustainable in increasingly competitive telecommunications markets.

2. For example, the explosive growth of the Internet is creating regulatory arbitrage opportunities[3] that are undermining existing interconnection regimes. Specifically, Internet telephony and Internet Protocol ("IP") telephony, which generally are not subject to interstate access charges, are increasingly becoming substitutes for traditional long-distance service that is subject to these charges. Thus, the continued growth of these services as their quality improves is likely to threaten the existing access charge regime.[4] In addition, the rapid increase in dial-up Internet usage is creating unbalanced traffic flows between local exchange carriers ("LECs"), which, under the reciprocal compensation scheme set forth in the 1996 Act,[5] is resulting in substantial revenue transfers from incumbent LECs ("ILECs") to competitive LECs ("CLECs") that serve Internet Service Providers ("ISPs"). This problem is referred to generally as the "ISP reciprocal compensation problem."[6]

3. This paper proposes a unified approach to interconnection pricing called Central Office Bill and Keep ("COBAK"), which would apply to interconnection arrangements between all types of carriers that interconnect with the local circuit-switched network – including agreements between two local exchange carriers and those

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[1] Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, *codified at* 47 U.S.C. §§ 151 *et seq*.

[2] *See* David Sieradzki, *Will Online Calls Kill Access Charges?*, LEGAL TIMES, May 8, 2000, at 35.

[3] The phrase "regulatory arbitrage" refers to profit-seeking behavior that seeks to take advantage of cost or revenue disparities that are due solely to regulation. It should be noted that this definition differs somewhat from the traditional definition of "arbitrage" as "an operation involving simultaneous purchase and sale of and asset . . . in two or more markets between which there are price differences or discrepancies." THE MIT DICTIONARY OF MODERN ECONOMICS 17 (David W. Pearce, ed. 1992).

[4] *See, e.g.*, Peter Huber, *Old Regulations Stifle the New Economy*, WALL ST. J., June 5, 2000 at A32; Mike Senkowski & Jeff Linder, *Is it a Zebra or a Striped Horse? Internet Telephony Challenges Traditional Regulatory Distinctions*, LEGAL TIMES, May 8, 2000, at 33-34; David Sieradzki, *supra* note 2. *See also Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Report to Congress, 13 FCC Rcd 11501 (1998) (*Stevens Report*) (discussing various types of Internet telephony and whether they should be subject to access charges).

[5] *See* 47 U.S.C. §§ 251(b)(5), 252(d)(2).

[6] *See, e.g.*, David Sieradzki, *supra* note 2.

between a local exchange carrier and an interexchange carrier (also referred to as "IXC" or "long-distance carrier"). COBAK also would apply to all types of traffic that pass over the local circuit-switched network – including local and long-distance calls, wireless to wireline calls, and dial-up connections to the Internet. As proposed, COBAK is a *default* interconnection regime, which means it would only apply when two networks cannot agree on the terms for interconnection.

4. As discussed in greater detail below, the COBAK proposal is premised in large part on three observations. First, both parties to a call – *i.e.*, the calling party and the called party – generally benefit from a call, and therefore should share the cost of the call.[7] By requiring interconnecting networks to recover most, if not all, of the cost of the call from their own customers, COBAK provides an efficient means by which the parties to a call can share the total cost of a call. The second observation is that competition operates more effectively when carriers recover their costs from their own end users, who can choose among competing carriers, rather than from interconnecting networks for whom the terminating carrier is a *de facto* monopolist. COBAK takes advantage of the forces of competition, where they exist, by requiring a carrier to recover all of its local access costs[8] from its end users. Finally, COBAK recognizes that opportunities for regulatory arbitrage arise when regulation results in different charges being assessed for the same facility depending on the specific services provided by that facility. COBAK eliminates these arbitrage opportunities by recovering the cost of certain telephone facilities (such as the local loop and local switching) directly from subscribers, and thereby eliminating the need to recover these costs from different services that are provided over these facilities.

5. The COBAK proposal consists of two rules for local calls involving two networks. First, the *called party's network* cannot charge the calling party's network for terminating the call.[9] Second, the *calling party's network* is responsible for the cost of transporting calls between the calling party's central office and the called party's central office.[10] As discussed below, these rules are easily extended to apply to calls requiring

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[7] *See, e.g.*, Patrick DeGraba, Efficient Interconnection Regimes for Competing Networks (October 2000) (on file with the Office of Plans and Policy, Federal Communications Commission).

[8] As discussed below, *local access costs* include the cost of the loop and the cost of the local switch nearest to the customer. *See* section III.A *infra*.

[9] In this sense, COBAK differs from most current interconnection regimes, under which the calling party's network must pay the called party's network for terminating the call. *See generally Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, First Report and Order, 11 FCC Rcd 15499, 16024-25 (1996) (*Local Competition First Report and Order*), aff'd in part and vacated in part sub nom. *Competitive Telecommunications Ass'n v. FCC*, 117 F.3d 1068 (8th Cir. 1997) and *Iowa Utils. Bd. v. FCC*, 120 F.3d 753 (8th Cir. 1997), aff'd in part and remanded, *AT&T v. Iowa Utils. Bd.*, 525 U.S. 366 (1999).

[10] As discussed in greater detail below, the calling party's network may accomplish this by: constructing its own transport links, purchasing transport facilities or services from the called party's network, or purchasing or leasing such facilities or services from a third network. In the early stages of moving from monopoly to competition – when incumbent local carriers still possess monopoly power over local network facilities – it will most likely be necessary to require the incumbent to provide transport facilities to

more than two networks, such as a long-distance call involving an interexchange carrier.

6. This paper is organized as follows. Section II provides a brief overview of existing interconnection regimes and their associated problems. Section III explains the COBAK proposal and provides examples of how it would apply. Section IV discusses the theoretical and policy justifications for the COBAK proposal. Section V discusses how COBAK eliminates or ameliorates the most important problems plaguing the current interconnection regime. Finally, Section VI raises certain implementation issues. The paper does not address any of the legal issues raised by the COBAK proposal or possible transition strategies, however.

II. OVERVIEW OF EXISTING INTERCONNECTION REGIMES AND THEIR PROBLEMS

7. In order to understand the COBAK proposal and its potential benefits, it is necessary to understand the existing patchwork system of interconnection arrangements and the problems associated with this system. Accordingly, this section first provides a broad overview of existing interconnection regimes. It then describes some of the problems associated with the existing system.

A. Existing Interconnection Regimes

8. For much of this century, local telephony was viewed as a natural monopoly.[11] Local telephone companies were given monopoly franchises and protected from competitive entry, but in return were subjected to rate regulation and certain universal service obligations.[12] Because of their monopoly position, however, local telephone companies had incentives to resist interconnecting with certain other networks.[13] More

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interconnecting networks at regulated rates. Nevertheless, even if the incumbent network provides the facilities, the cost of transporting the call remains on the calling party's network, which either leases the incumbent's facilities or purchases transport services from the incumbent. *See* sections III.A, III.B *infra*.

[11] *See, e.g.,* PETER W. HUBER, MICHAEL K. KELLOGG & JOHN THORNE, FEDERAL TELECOMMUNICATIONS LAW 2 (2d ed. 1999) (hereinafter "PETER W. HUBER, ET AL.") ("The high cost of fixed plant, the steadily declining average cost of service, and the need for all customers to interconnect with one another made it seem both sensible and inevitable to have a single, monopoly provider."); JEAN-JACQUES LAFFONT & JEAN TIROLE, COMPETITION IN TELECOMMUNICATIONS 3 (2000) ("The absence of competition was motivated by the existence of large fixed costs in several parts of the network, whose duplication was neither privately profitable nor socially desirable; the telecommunications industry was deemed to be a 'natural monopoly.'"). *See also AT&T v. Iowa Utils. Bd.*, 525 U.S. 366, 370 (1999) ("Until the 1990s, local phone service was thought to be a natural monopoly.").

[12] *See generally* PETER W. HUBER, ET AL., *supra* note 11 at 212-26 (summarizing early history of telephone regulation); GERALD W. BROCK, TELECOMMUNICATION POLICY FOR THE INFORMATION AGE 63-70 (1994) (same).

[13] *See, e.g.,* David F. Weiman & Richard C. Levin, *Preying for Monopoly? The Case of Southern Bell Telephone Company, 1894-1912*, 102 J. POL. ECON. 103 (1994) (describing predatory strategies of AT&T,

specifically, local telephone companies generally had no incentive to interconnect with competing local telephone companies, and, when forced to interconnect, generally sought to impose high interconnection costs on other networks.[14] As a result, regulators, both at the state or federal level, traditionally have intervened and regulated interconnection arrangements between local telephone companies and other interconnecting parties.

9. In addition, regulators at both the federal and state levels have frequently used interconnection regulation to achieve various social goals. For example, in order to keep local rates low, both federal and state regulators have permitted local telephone companies to charge long-distance companies above-cost access charges for originating and terminating long-distance calls.[15] Similarly, in order to encourage the development of enhanced services, the Commission in 1983 exempted enhanced service providers from these access charge requirements.[16]

10. What has resulted over time is a complex and frequently arbitrary patchwork of interconnection regulations that treats different classes of interconnecting parties and different types of services quite disparately even though there may be little difference in the costs that they generate.[17] The interconnection regime that applies in a particular situation depends on such factors as: whether the interconnecting party is another local carrier, an interexchange carrier, or a subscriber; whether the service is classified as local or long-distance, interstate or intrastate, or basic or enhanced; and whether a call is completed using an enhanced service provider.

11. Broadly speaking, however, interconnection rules can be divided into two basic types: one set of rules that applies to "local" calls, and a second set of rules that applies to "long-distance" calls. Both sets of rules are, of course, subject to a number of exceptions.

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including its refusal to interconnect with independent telephone companies); PETER W. HUBER, ET AL., *supra* note 11 at 213 (same).

[14] *See* section IV.A *infra*.

[15] *See, e.g., Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Report and Order, 12 FCC Rcd 8776, 8784-85, at paras. 10-12 (1997) (*Universal Service Report and Order*) (discussing implicit subsidies, including those in access charges); PETER W. HUBER ET AL., *supra* note 11 at 552 (same).

[16] *See MTS and WATS Market Structure*, CC Docket No. 78-72, Memorandum Opinion and Order, 97 FCC 2d 682, 711-12 (1983) (*MTS and WATS Order*).

[17] This system of interconnection regulation is further complicated by the fact that telecommunications users, telecommunications carriers and other service providers can interconnect with an incumbent LEC's network in a variety of ways. For example, a party can interconnect with an incumbent LEC's network at the line side or trunk side of a switch, and it can interconnect at an end-office switch or a tandem switch. *See, e.g., Local Competition First Report and Order*, 11 FCC Rcd at 15608-09, paras. 209-12. Similarly, a party seeking to interconnect with an incumbent LEC can construct its own transport links to connect to the incumbent's network, or it can purchase them from the incumbent or from third parties. *See, e.g., Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98, Third Report and Order and Fourth Further Notice of Proposed Rulemaking, 15 FCC Rcd 3696 (1999) (*Local Competition Third Report and Order*).

12. Thus, for example, when a customer of one LEC makes a local call to a customer of another LEC, that local call is subject to reciprocal compensation.[18] Under the Commission's current reciprocal compensation rules for incumbent LECs, the calling party's network generally must pay the called party's network to terminate the call (*i.e.*, to deliver the call from the central office serving the called party to the called party's premises).[19] In addition, if the calling party's network uses the transport facilities of the called party's network to deliver the call to the called party's local central office, it must also pay the called party's network for transport. The Commission's current rules also permit states to impose bill-and-keep arrangements if "traffic is relatively balanced."[20]

13. If the call is a long-distance call, however, then the calling party's interexchange carrier must pay both the originating local carrier and terminating local carrier either intrastate or interstate access charges, depending on whether the call crosses state lines. Finally, if the call is a long-distance call, but the customer uses a computer connected to an ISP to make an Internet telephony call, no originating access charges would be owed.[21]

14. An alternative way to analyze interconnection regimes is to distinguish between "calling-party's-network pays" (CPNP) regimes and "bill-and-keep" regimes. In CPNP regimes, which cover the majority of interconnection arrangements for basic voice traffic, the calling party's network (the local exchange carrier in the case of a local call or the interexchange carrier in the case of a toll call) pays the called party's local network to terminate a call (and possibly also to transport the call). Thus, in the case of a local call, the calling party's LEC is required to pay transport and termination for traffic that terminates on the called party's network. Similarly, in the case of a long-distance call, the calling party's interexchange carrier must pay terminating access charges, either interstate or intrastate, to the called party's LEC to terminate the call (as well as originating access charges to the calling party's LEC to originate the call).

15. The second type of arrangement involves no inter-carrier compensation and is generally referred to as a "bill-and-keep" arrangement.[22] Under such arrangements, the

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[18] *See* 47 U.S.C. §§ 251(b)(5), 252(d)(2). *See also Local Competition First Report and Order*, 11 FCC Rcd at 16008-58, paras. 1027-1118.

[19] *See id.* at 16024-25, paras. 1057-58.

[20] *Id.* at 16055, para. 1112. It is interesting to note that traditionally contiguous, but non-overlapping incumbent local exchange networks have frequently exchanged traffic on a bill-and-keep basis.

[21] *See MTS and WATS Order*, 97 FCC 2d 682; *see generally* PETER W. HUBER, ET AL., *supra* note 11 at 127-29. Whether terminating access charges would be owed depends on how the provider of the Internet telephony service decides to terminate the call. It appears that today many such providers find it easier simply to pay terminating access charges when delivering the call.

[22] *See, e.g., Local Competition First Report and Order*, 11 FCC Rcd at 16045-58, paras. 1096-1118 (discussing bill-and-keep interconnection arrangements); *Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers*, CC Docket No. 95-185, Notice of Proposed Rulemaking, 11 FCC Rcd 5020 (1996) (*LEC-CMRS Interconnection NPRM*) (same).

calling party's carrier does not have to pay the called party's carrier to terminate a call; rather, the called party's carrier must recover the cost of termination from its end-user customer.[23] As previously indicated, such arrangements traditionally existed between adjacent local exchange carriers, such as between a Bell Operating Company ("BOC") and a neighboring rural ILEC. In addition, the 1996 Act states that the pricing rules applicable to interconnection agreements between incumbent LECs and other LECs do not "preclude" bill-and-keep arrangements.[24]

B. Problems Caused by Existing Interconnection Regimes

16. The current collection of interconnection regimes is not only complex – it also suffers from a number of fundamental problems. These problems distort usage of the network and deployment of facilities, impede the development of competition and the relaxation of regulation, and threaten the continued viability of the existing system.

17. First and foremost, the current interconnection regimes create significant opportunities to game the system through regulatory arbitrage. One such opportunity arises from the fact that IXCs must pay interstate and intrastate access charges to the LEC that originates a long-distance call, while an ISP that provides Internet or Internet Protocol ("IP") telephony does not.[25] Consequently, an end user can avoid access charges by utilizing IP telephony to place long-distance calls.[26] Although this has not proven a

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[23] The treatment of transport costs may vary depending upon the specific bill-and-keep proposal. *See* section IV.D *infra*.

[24] 47 U.S.C. § 252(d)(2)(B).

[25] The phrases "Internet telephony" and "Internet Protocol telephony" ("IP telephony") refer to similar, but distinct concepts. IP telephony involves the provision of a telephony service or application using Internet Protocol. IP telephony may be provided over the public Internet or over a private IP network. In contrast, Internet telephony is a subset of IP telephony that is distinguished by the fact that it is provided over the public Internet and uses the domain-name system for routing. *See, e.g., Stevens Report*, 13 FCC Rcd at 11541-51, paras. 83-104 (discussing Internet and IP telephony); HARRY NEWTON, NEWTON'S TELECOM DICTIONARY 378 (14th ed. 1998) (same). For simplicity, the text will refer generally to the broader concept of IP telephony.

IP telephony can also be categorized by the equipment used to provide the service. For example, IP telephony may be provided using two personal computers ("computer-to-computer" IP telephony); the service may be provided between a computer and a standard telephone using a single IP gateway ("computer-to-phone" IP telephony); or it may be provided using two standard telephones that connect through two IP gateways ("phone-to-phone" IP telephony). *See, e.g., Stevens Report*, 13 FCC Rcd at 11543-44, paras. 87-89.

[26] Depending on how an IP telephone call is provided, the call may be subject to access charges, reciprocal compensation, or no charges. As an example, suppose that two parties make a computer-to-computer IP telephone call. In this case, no access charges would apply, but reciprocal compensation charges might apply. In particular, if the calling party's ISP is a customer of a different LEC than the calling party himself, then the calling party's LEC is likely to be required to pay reciprocal compensation to the ISP's LEC. In this case, not only does the calling party's LEC not receive access charges, but it must also pay reciprocal compensation. If, on the other hand, the calling party and the calling party's ISP were both customers of the same LEC, then no inter-carrier charges would apply.

serious problem to date, improvements in the quality of IP telephony could lead to significant substitution of IP telephony for traditional circuit-based long-distance service, with a consequent erosion in access revenues. A second source of regulatory arbitrage arises from the fact that the interconnection charges, which the calling party's network has to pay to the called party's network, generally are above cost and inefficiently structured.[27] Thus, for example, various CLECs have targeted ISPs, which generally have only incoming traffic, as customers, in order to become net recipients of local traffic. ILECs claim that this has cost them billions of dollars in reciprocal compensation payments.[28] Both sources of regulatory arbitrage can distort the incentives of carriers to invest and deploy facilities efficiently and to offer services to customers.[29]

18. A second problem is that current interconnection regimes typically confer on all local carriers market power over terminating access. This market power arises from the fact that interconnecting originating networks, including both local and interexchange carriers, have no alternative carrier that can terminate a call. In effect, each terminating carrier, no matter how small, has a monopoly over termination to its own customers. Moreover, under existing rules, neither the calling party nor the called party will have to pay the excessive termination charges, and, therefore, there will be no incentive for the called party to switch carriers. More specifically, the called party, by definition, will not incur the excessive termination charges, and, because of geographic rate-averaging requirements,[30] the calling party will have little or no incentive to complain to the called party or ask him to switch carriers. This presents regulators with the unattractive choice of allowing non-incumbent carriers to exercise their market power,[31] permitting IXCs to refuse to deliver calls to terminating carriers that charge excessive rates, or regulating the terminating access rates of all carriers, including those that would not possess market

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[27] Termination charges typically are structured as per-minute charges. Yet it is clear that most switching costs are based on required peak capacity rather than minutes of use. *See, e.g., Access Charge Reform*, CC Docket No. 96-262, Fifth Report and Order and Further Notice of Proposed Rulemaking, 14 FCC Rcd 14221, 14328-30, paras. 211-16 (1999) (*Pricing Flexibility Order and NPRM*) (noting that switching costs vary with peak demand and not the total number of switched minutes).

[28] *See, e.g.*, Letter from W. Scott Randolph, Verizon Communications, to Magalie R. Salas, Secretary, FCC (Nov. 1, 2000), filed in Docket No. 99-68.

[29] Most dial-up Internet service still passes through the circuit switches of the traditional telephone network. It would be more efficient, however, to strip such calls off the circuit-switched network before they reach the calling party's switch, route them over a packet-switched network, and then bypass the called party's circuit switch when terminating the call. Doing so would eliminate the need to tie up a circuit during an Internet session, which is clearly inefficient as packets are transferred during only a small fraction of the period a customer is online. CLECs serving ISPs would, most likely, oppose such an arrangement, however, since it would prevent them from collecting termination charges on a per-minute basis.

[30] Note that, because of geographic rate-averaging requirements, IXCs cannot pass these high termination charges directly through to calling parties who place calls to these high-priced networks. Thus, end-user customers on networks with high termination charges are unlikely even to hear complaints from the parties that call them.

[31] ILECs generally are not able to exercise terminating market power because their interconnection rates are regulated.

power under alternative interconnection regimes.[32]

19. Third, the existing system of inter-carrier interconnection charges is likely to result in inefficient end-user charges. To the extent that interconnection charges tend to be traffic sensitive (*i.e.*, set on a per-minute or per-call basis), they create pressure on carriers to adopt traffic-sensitive retail prices. If the underlying network costs are not traffic sensitive, however, then these traffic-sensitive retail rates will reduce usage of the network to inefficient levels.[33] In addition, such interconnection charges may result in customers paying higher prices for calls that cross networks than for calls that remain on one network. Such pricing would be inconsistent with the goal of providing interconnection between networks that is seamless and transparent to customers.

20. Finally, as will become clear below, a fundamental flaw with a majority of the existing interconnection regimes is that they are CPNP regimes, which impose all of the costs of a call on the calling party. Many of the problems affecting current interconnection regimes can be solved by moving to an interconnection regime that appropriately divides the cost of a call between the calling party and the called party. The next section proposes such a regime.

III. THE COBAK PROPOSAL

21. This section presents an approach to interconnection pricing called "Central Office Bill and Keep" or "COBAK." COBAK is a default interconnection regime, which would apply only when two networks cannot agree on the terms for interconnection. In contrast to the existing patchwork of interconnection regimes, COBAK is a unified approach to interconnection pricing, which would apply to all types of carriers that interconnect with, and to all types of traffic that passes over, the local, circuit-switched network. Thus, COBAK applies to both local and toll traffic (including interstate and intrastate toll), and it applies to interconnection agreements between, for example, competing local carriers, adjacent local carriers, wireless and wireline carriers, and local and long-distance carriers.

22. This section first sets forth the COBAK proposal. It then illustrates how the COBAK rules would apply to a number of different interconnection scenarios.

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[32] *See, e.g., Pricing Flexibility Order and NPRM*, 14 FCC Rcd at 14312-20, paras. 180-90 (discussing problem of CLEC access charges). *See also* JEAN-JACQUES LAFFONT & JEAN TIROLE, *supra* note 11 at 186 (discussing "common fallacy" that small players do not have market power and should therefore face no constraint on their termination charges). In fact, carriers with smaller market shares may have a greater incentive to charge excessive terminating access charges because those charges are unlikely to be flowed through to interconnecting carriers' end-user prices. *See id*.

[33] More specifically, because carriers will view traffic-sensitive interconnection charges as raising their marginal costs, they will tend to raise their traffic-sensitive retail prices, even though the underlying cost structure of the networks may be non-traffic-sensitive.

A. The COBAK Rules

23. For purposes of this discussion, consider a telecommunications network as consisting of two parts: (1) *local access facilities*, consisting of the loop serving the customers' premises and the central office switches that serve the customers' loops, and (2) *transport facilities*, consisting of both inter-office trunks and tandem switches.[34] Further, for purposes of this discussion, define *termination* as the delivery of a call, by the called party's network, over the local access facilities to the called party, and *transport* as the routing and delivery of a call from the calling party's central office to the called party's central office.[35]

24. With these definitions, COBAK can be described in terms of two basic, default rules. The first rule specifies how the cost of local access facilities should be recovered, while the second specifies which network is responsible for the cost of transport. For simplicity, let us begin by considering calls that traverse just two networks, such as a local call that originates on one local network and terminates on another local network in the same local calling area.

Rule 1: No carrier may recover any costs of its customers' local access facilities from an interconnecting carrier. This rule means that the called party's network cannot charge the calling party's network to recover any costs associated with either the called party's loop or the switch that serves that loop. Thus, each carrier must recover the cost of local access facilities from its own end-user customers.

Rule 2: For calls traversing two networks, the calling party's network is responsible for the cost of transporting the call to the called party's central office. Because the calling party's network is responsible for transporting a call to the called party's central office, the calling party's network must either provide its own transport facilities or pay another carrier, including possibly the called party's carrier, to transport the call to the central office serving the called party.

25. The following examples illustrate these rules. First, suppose that there are two networks, and each builds its own transport facilities to connect its network to the other network's central offices. In this case, the calling party's network would deliver a call from the calling party to the central office of the called party, where the called party's

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[34] A loop provides connection between the customer and the central office that switches a call onto the transport network. The term "loop," as used here, can refer either to the traditional wireline facility that connects a customer's premise to a switch, or a wireless connection, whether fixed or mobile, between a customer and the switch of the wireless network. The central office can be viewed as a place in the network where loops are aggregated and calls are switched onto the transport network. *See* section VI.A *infra*.

[35] *Cf. Local Competition First Report and Order*, 11 FCC Rcd at 16015, paras. 1039-40 (defining *termination* as "the switching of traffic that is subject to section 251(b)(5) at the terminating carrier's end office switch (or equivalent facility) and delivery of that traffic from that switch to the called party's premises," and *transport* as "the transmission of terminating traffic that is subject to section 251(b)(5) from the interconnection point between the two carriers to the terminating carrier's end office switch that directly serves the called party (or equivalent facility provided by a non-incumbent carrier).").

network would then terminate the call. Since both networks in this example possess their own transport facilities, the networks would exchange traffic at the central offices of the called party on a bill-and-keep basis – hence the name "Central Office Bill and Keep." Now suppose that a calling party's carrier physically interconnected at some point on the called party's network other than at the called party's central office, such as at a tandem switch. In this case, the calling party's network would have to pay the called party's network for the use of the tandem switch and for transport links to the central office. It would not, however, pay a termination charge to contribute to the cost of the central office switch or the loop. Finally, it should be noted that a carrier could satisfy Rule 2 by leasing transport facilities or purchasing transport services from a third party. This last option is becoming more likely as the market for transport becomes increasingly competitive.

26. For calls traversing three networks, such as a long-distance call carried by an interexchange carrier, the first rule remains the same, while the second rule only requires slight modification. Under COBAK, the calling party is responsible for all of the costs of transport to the central office serving the called party. The calling party satisfies this responsibility by contracting with both a local network that will originate the call and an interexchange network that will transport the call from the calling party's local network to the called party's central office. More specifically, under COBAK, the calling party's *local carrier* is responsible for carrying the call from the calling party to the point of presence ("POP") of the calling party's interexchange carrier. The calling party's *interexchange carrier* is then responsible for carrying the call to the central office serving the called party. As with a local call, the called party's network is responsible for the cost of terminating a call over the local access facilities.

27. Thus, COBAK eliminates *all* originating access charges. It also eliminates any terminating access charges intended to recover the cost of the loop or the terminating central office. COBAK does not, however, eliminate access charges for terminating transport if the IXC uses the terminating LEC's transport facilities.

28. Notice that, in an interexchange call, the calling party's local network is responsible for delivering the call to the interexchange carrier's POP, just as it is responsible, in the case of a two-network call, for delivering the call to the central office of the called party. Thus, Rule 2 may be modified as follows:

Rule 2A: For interexchange calls, the calling party's local network is responsible for delivering the call to the point of presence of the calling party's interexchange carrier; the calling party's interexchange carrier is then responsible for delivering the call to the called party's central office.

29. It is worth reiterating that COBAK is a default interconnection regime which would apply only if two interconnecting carriers are unable to reach a negotiated agreement on the terms of interconnection. It does not constrain in any way the kind of agreement carriers are allowed to negotiate.

30. This does not mean that the COBAK rules will not influence negotiated

outcomes. In fact, the default rules, to a large extent, will determine the outcome of the negotiation. For example, COBAK's Rule 2 often creates incentives for interconnecting networks to establish a meet point between their two networks and to exchange traffic within a specific geographic area on a bill-and-keep basis at that point. In particular, to the extent that two carriers have relatively balanced traffic exchanges, they are likely to find it in their mutual interest to agree to such a meet-point arrangement, as this arrangement is likely to be less expensive than each carrier's building it own separate transport facilities to each central office of the other network.[36] Similarly, several networks could agree to establish a common network access point ("NAP") or point of interconnection (similar to NAPs in the Internet) and all exchange traffic on a bill-and-keep (or other agreed upon) basis at such a point.[37]

31. It is also worth pointing out that COBAK represents an approach to *interconnection pricing* between carriers; it does *not* specify how retail rates should be set. To the extent that local switch costs that formerly were recovered through access charges must now be recovered from end users, COBAK does not specify how those costs should be recovered. COBAK thus would not preclude regulators from simply shifting the per-minute, local-switching access charges from the IXC to the LEC's customer.[38]

32. Finally, COBAK does not preclude alternative retail relationships between a carrier and an end user. For example, it would not be inconsistent with COBAK for an interexchange carrier to offer an "800 service" in which the called party pays the interexchange carrier for the cost of transporting the call. Nor would COBAK preclude a "calling-party-pays" service, where the called party's carrier bills calling parties (who may not be subscribers) for the cost of terminating a call.[39] In fact, a carrier seeking to offer a "calling-party-pays" service could even negotiate with the calling party's network

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[36] Even if traffic is not balanced, interconnecting networks are still likely to have an incentive to share the cost of building shared transport links. Specifically, provided that both networks originate some traffic and that it is cheaper to build a single shared transport facility than two separate transport facilities, then the parties will have an incentive to agree to a shared facility whose cost would be split in some way between the two carriers.

[37] In fact, it has been proposed that the Commission establish such points of interconnection and require networks to interconnect on a bill-and-keep basis at such points. Douglas A. Galbi, *Transforming the Structure of Network Interconnection and Transport*, 8 J. COMM. L. & POL. 203 (2000). While there are clearly some advantages of such an arrangement, such as eliminating the need to determine what qualifies as a central office, it creates administrative problems of its own, including determining where such points would be located, who would run such interconnection points, and how the quality level of interconnection would be determined and maintained.

[38] This issue is discussed in greater detail in section VI.F *infra*.

[39] Such "calling-party-pays" services are commonly offered by wireless carriers in other countries. In addition, the Commission addressed this issue in *Calling Party Pays Service Offering in the Commercial Mobile Radio Services*, WT Docket No. 97-207, Declaratory Ruling and Notice of Proposed Rulemaking, 14 FCC Rcd 10861 (1999). Of course, such calling-party-pays arrangements create a terminating access problem. *See, e.g.*, Office of Telecommunications, Price Control Review (Oct. 2000) at paras. 2.32-2.35 (discussing need to regulate price of calls made by wireline customers to wireless customers).

to have the latter network act as the collection agent. COBAK would only preclude the terminating carrier's demand that the originating carrier pay the cost of terminating a call as a condition for interconnection.

B. Illustrative Applications of the COBAK Rules

33. The following examples illustrate how COBAK would apply to a number of different interconnection scenarios.

34. *Example 1 – A Local Call Between Two Networks Interconnecting at the Central Office:* Suppose there are two local networks in a city, A and B, each of which owns one local switch. In addition, assume that A owns a transport trunk connecting its switch to B's switch. In this case, for calls originating on A's network, A will use its own transport facilities to deliver calls to B's central office, and it will not have to pay B to terminate these calls. Thus, for these calls, interconnection occurs on a bill-and-keep basis at B's central office.

35. Suppose now that one of B's customers originates a call to a customer on A's network. B is responsible for the cost of transporting the call to A's central office. To satisfy this responsibility, B could either build its own transport trunk, use A's transport facilities, in which case it would pay A for this transport, or purchase transport from a third party.

36. *Example 2 – A Local Call Between Two Networks with Interconnection at a Tandem Switch:* Again, assume that there are two local networks, but this time further assume that A has several central offices connected to a tandem switch, while B has just one central office switch. Finally, assume that B interconnects with A at the tandem switch. In this case, if a customer of B calls a customer of A, B would have to pay A for the cost of tandem switching and transport from the tandem to the called party's central office, but B would not have to pay termination costs. Thus, A could not charge B for any part of the cost of the local switch or the called party's loop.

37. Suppose now that a customer of A calls a customer of B. In this case, A could carry the call to B's central office, in which case it would owe B nothing. Or, A could choose to use B's interconnection trunks. In this case, A would have to pay B for transport from the tandem switch to B's central office, but A would not have to pay B for termination.

38. *Example 3 – A Long-Distance Call Involving an Interexchange Carrier:* Suppose that a customer wants to make a long-distance call. The calling party's local carrier is responsible for delivering the call to the point of presence, or POP, of the calling party's interexchange carrier and can only recover this cost from the end user and not the IXC. The calling party's IXC is then responsible for delivering the call to the central office serving the called party. It recovers this cost from its customer, the calling party. Finally, the terminating local carrier serving the called party is responsible for delivering the call from the central office to the called party, and it recovers the termination costs from its end user, the called party. As discussed above, the only access

charges the IXC might have to pay are for transport to the local central office of the called party.

39. *Example 4 – A Long-Distance Call Involving a LEC with No Direct Connection to the IXC:* Suppose a rural LEC connects indirectly to the POP of an IXC by "transiting" the network of a larger adjacent LEC. For an interexchange call made by the rural LEC's customer, the rural LEC is responsible for delivering the call to the IXC's POP. This means, in this case, that the rural LEC will have to pay a transport charge to the larger adjacent LEC to have the latter transport the call to the IXC's POP.

40. Suppose now that the rural carrier's customer is a recipient of a long-distance call. In this case, COBAK dictates that the IXC is responsible for transporting the call to the rural LEC's central office, which serves the called party. This means that the IXC will have to pay transport charges to cover the cost of transport from its POP to the rural LEC's central office. This transport charge, which normally is billed by the larger LEC that is actually connected to the IXC, would then be split between the rural LEC and the larger adjacent LEC.

41. It may be helpful to compare COBAK to existing interconnection regimes. With respect to local calls, COBAK resembles the existing reciprocal compensation rules in making the calling party's network responsible for the cost of transporting the call to the central office of the called party. COBAK differs from the existing reciprocal compensation scheme in that the called party's carrier cannot recover from the calling party's network any of the cost of terminating the call over the called party's local access facilities.

42. For interstate and intrastate long-distance calls, COBAK represents a more significant departure from the existing access charge regime. As previously mentioned, the IXC, under COBAK, will pay no originating access charges at all to the calling party's local carrier, and it will pay no local switching or carrier-common-line charge to the called party's local carrier. At most, it will only pay the called party's local carrier for transport from the POP to the central office, should it choose to use the transport facilities of the called party's local carrier.

43. It is worth emphasizing that this paper is not proposing that COBAK be made the default for interconnection negotiations among Internet backbones. Internet backbones have been able to negotiate interconnection agreements among themselves without any regulatory intervention so far, and there appears to be no good reason to modify the existing system where it appears to be working well without the assistance of regulators.

IV. THEORETICAL AND POLICY JUSTIFICATIONS FOR COBAK

44. The previous section laid out the COBAK proposal and provided examples of how it would apply to various interconnection scenarios. This section describes the theoretical and policy rationales underlying the COBAK proposal. More specifically, the

section first discusses the appropriate goals of an interconnection pricing regime in competitive markets. It next discusses the critical assumptions underlying the prevailing CPNP interconnection regimes – that the calling party is the sole cost-causer and sole beneficiary of a call – and explains why those assumptions are unrealistic and need to be reconsidered as competition is introduced into telecommunications markets. The section then explains the implications for interconnection pricing of adopting the more realistic assumption that both parties to a call "cause" the call and benefit from the call. Finally, the section lays out the theoretical and policy justifications for the two COBAK rules. In this regard, the section also explains how COBAK's default rules should encourage parties to negotiate efficient interconnection agreements without the need for regulatory intervention.

A. The Appropriate Goals of an Interconnection Pricing Regime in Competitive Markets

45. There is general, though not universal, agreement that some regulation of interconnection is required at least between incumbent local exchange carriers and entering competitors. As suggested above, this is because small, new networks need interconnection with large networks in order to attract customers and compete with the incumbent. Without such interconnection, small networks would provide connection to only a few other customers, which would severely limit the value of their network. Large, incumbent networks, on the other hand, have a strong incentive to refuse to interconnect at all or to interconnect only on terms or conditions that would competitively disadvantage their new competitors, as a means of forestalling competition.[40]

46. While suggesting the need for some form of interconnection regulation, these observations do not explain which form of interconnection regulation is most desirable from society's perspective. Moreover, regulators historically have used interconnection policy to achieve a variety of objectives, and have not always clearly articulated those objectives.[41] Finally, at least under certain interconnection regimes, the regulatory objectives appear to conflict. For example, building implicit subsidies into interconnection rates might encourage universal service, yet it is inconsistent with the goal of encouraging the efficient use of the network by customers, the efficient deployment of facilities by carriers, and the efficient development of competition.

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[40] *See, e.g., Local Competition First Report and Order*, 11 FCC Rcd at 15508, para. 10 ("Because an incumbent currently serves virtually all subscribers in its local serving area, an incumbent LEC has little economic incentive to assist new entrants in their efforts to secure a greater share of the market. An incumbent LEC also has the ability to act on its incentive to discourage entry and robust competition by not interconnecting its network with the new entrant's network or by insisting on supracompetitive prices or other unreasonable conditions. . . " (footnote omitted)); *see also* Robert D. Willig, *The Theory of Network Access Pricing, in* ISSUES IN PUBLIC UTILITY REGULATION 109, 146 (H. Trebing, ed. 1979); Mark Armstrong, Chris Doyle & John Vickers, *The Access Pricing Problem: A Synthesis*, 44 J. IND. ECON. 130 (1996); Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AMER. ECON. REV. 424 (1985).

[41] *See, e.g.*, JEAN-JACQUES LAFFONT & JEAN TIROLE, *supra* note 11 at 98 (noting that interconnection regulation generally "must reflect multiple objectives.").

Similarly, as discussed below, an interconnection regime that leads to efficient use of the network may be inconsistent with reduced regulation over time.[42]

47. With the introduction of competition into telecommunications markets, and particularly local telecommunications markets, however, regulators need to limit the objectives they seek to accomplish with interconnection policy in order not to distort the development of competition.[43] In particular, regulators need to focus on designing an *efficient* interconnection regime. This means, first, that the interconnection regime should encourage consumers to make efficient use of telecommunications networks, and, second, that it should encourage networks to make efficient investment in, and deployment of, network infrastructure.

48. In addition, efficiency means that the interconnection regime should minimize regulatory costs. Such regulatory costs include not only the administrative costs of regulation, but also costs associated with market distortions resulting from regulatory mistakes or imperfect information on the part of the regulator, which might, for example, lead to a miscalculation of interconnection costs. These considerations suggest that a default interconnection rule should be simple and easy for the regulator to implement.

B. Revisiting the Assumptions Underlying the Current CPNP Interconnection Regime

49. Economic analyses of interconnection pricing have generally assumed that the calling party is the sole cost-causer and the sole beneficiary of a call. While these assumptions may have been a useful means of simplifying the analysis of various interconnection pricing problems, they have long been recognized as unrealistic,[44] and, with the growth of competition in telecommunications, they need to be reconsidered.

50. As competition was introduced into the long-distance market, economists began considering the price that an incumbent local telephone company, controlling a bottleneck facility, should charge a competing long-distance company for access to its network.[45] A particular focus of these studies was how to set the price of access along

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[42] *See* paras. 89-90 *infra*.

[43] To the extent that regulators seek to achieve other goals as well, they should address these separately from interconnection policy. In addition, with the introduction of competition, regulators need to take care that their efforts to achieve these other goals do not distort the efficient development of competition.

[44] *See, e.g.*, Robert D. Willig, *supra* note 40 at 124-28 (discussing the fact that the called party generally benefits from a call); Lyn Squire, *Some Aspects of Optimal Pricing for Telecommunications*, 4 BELL J. ECON. 515 (1973) (same).

[45] Early studies included: Roland Artle & Christian Averous, *The Telephone System as a Public Good: Static and Dynamic Aspects*, 4 BELL J. ECON. 89 (1973); Lyn Squire, *supra* note 44; Jeffrey Rohlfs, *A Theory of Interdependent Demand for a Communications Service*, 5 BELL J. ECON. 16 (1974); Robert D. Willig, *supra* note 40. For more recent studies, *see, e.g.*, Jean-Jacques Laffont & Jean Tirole, *Access Pricing and Competition*, 38 EUR. ECON. REV. 1673 (1994); Mark Armstrong, Chris Doyle & John Vickers, *The Access Pricing Problem*, 44 J. Ind. Econ. 131 (1996); Jean-Jacques Laffont, Patrick Rey & Jean Tirole, *Network Competition: I. Overview and Nondiscriminatory Pricing*, 29 RAND J. ECON. 1

with the prices of other retail services offered by an incumbent carrier, so as to achieve efficient usage of the network while simultaneously taking account of network externalities and recovering the large, fixed costs exhibited by local telephone networks. To make their analyses tractable, these models tended to assume that the calling party was the sole cost-causer and sole beneficiary of the call.[46]

51. With the introduction of competition in local markets, the assumption that the calling party is the only cost-causer creates additional, and potentially more serious, inefficiencies. In particular, models employing this assumption generally do not consider many of the problems facing today's interconnection regimes, such as the ISP reciprocal compensation problem, the arbitrage problem caused by IP telephony, and the terminating access problem caused by competitive LECs not subject to rate regulation.

52. Given these new problems, it seems necessary to reconsider the assumptions made by these earlier studies that the calling party is the sole cost-causer and sole beneficiary of a call. As discussed below, it is critical to recognize that both the calling party and called party jointly cause the call and that both benefit. Adopting these more realistic assumptions, moreover, leads to alternative interconnection pricing regimes that solve many of the problems facing the existing regime.

53. With respect to cost causation, it is only a slight over-simplification to say that the cost a network incurs from completing a phone call is the cost of having a circuit used during the call. This "congestion" cost is the same for a network whether the call is originated by its end-user customer or received by its end-user customer.[47] Thus, with respect to resources used in a call, both the calling party's and called party's networks should be essentially indifferent whether its customer originated a particular call or its customer received the call. Finally, since both parties must agree to continue to carry on a conversation, it makes more sense to view both the calling party and called party as jointly causing the costs of a call.[48]

(1998); Jean-Jacques Laffont, Patrick Rey & Jean Tirole, *Network Competition: II Price Discrimination*, 29 Rand J. Econ. 38 (1998). *See generally* JEAN-JACQUES LAFFONT & JEAN TIROLE, *supra* note 11 at 102-04.

[46] Although these earlier studies assumed (at least implicitly) that the calling party was the sole beneficiary of the call, the authors of the studies, as previously indicated, clearly recognized that, in reality, both parties tended to benefit from calls. *See, e.g.*, Lyn Squire, *supra* note 44; Robert D. Willig, *supra* note 40 at 124-28. The reason that these authors were willing to make this simplifying assumption appeared to be that they believed that the parties to the call could internalize the cost of the call. *Id.* at 128.

[47] Of course, there also may be certain call set-up costs associated with initiating a call. These costs do not undermine the basic point, however, that both parties are responsible for continuing a call.

[48] A related argument is that, if the calling party had not initiated the call, then the call would not have been made. Thus, it has been argued that the calling party is the cost-causer and therefore should be charged *all* the costs of the call. This reasoning is wrong for at least two reasons. First, even if we grant that the call would not have occurred if the calling party did not initiate it, it is equally true that the call cannot continue without the consent of the called party. Thus any costs incurred by networks for the duration of the call are a result of a joint decision of the calling party and the called party to continue the call. Therefore, the calling and the called party are jointly responsible for all costs incurred during the duration of the call.

54. Similarly, with respect to benefits, it appears to make more sense to assume that, with respect to the vast majority of calls, both parties will receive some benefit. For example, a customer who, upon listening to his answering machine, calls someone who had left a message suggests that both parties to the call clearly expect to receive a benefit. Similarly, businesses that take 800 service, such as mail order catalogues, and other businesses that depend on in-coming calls, such as pizza delivery services, are further examples of situations where the called party clearly receives some benefits from a call. Finally, while it is true that people receive some unwanted calls (for example from telemarketers), it appears that these calls represent a small fraction of telephone traffic and thus hardly present the basis upon which to build an entire interconnection regime. This is particularly true given that the called party can simply hang up on unwanted calls.

55. Thus, in contrast to earlier economic analyses of interconnection pricing, it appears more appropriate to assume that both parties jointly cause the call, and that both share in the benefits of a call. We now consider some of the implications of changing the traditional assumptions. In order to simplify the discussion, we will further assume that the two networks have equal costs and that, on average, the called party and the calling party share equally in the benefit of a call.[49]

C. Implications of Revising the Assumptions Concerning Cost Causation and Benefits

56. One clear implication of the traditional assumption that the calling party is the sole cost-causer and sole beneficiary of a call is that the calling party should bear the full incremental cost of the call. This assumption provides the theoretical basis for CPNP regimes. If, instead, we assume that both parties to a call benefit from the call and that both jointly cause it, then this suggests that a CPNP regime in which the calling party bears the entire incremental cost of the call will not be efficient. This point is briefly developed below.

1. Efficient Usage by Customers

57. It is well established in economics that, for private goods[50] that are individually consumed by specific customers, the price should be set equal to marginal or

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Second, as a general matter, it is not true that, if the calling party did not make the call, then the call would not be made. As a simple counter example, suppose a customer on network A calls a customer on network B. When the called party does not answer the phone, the calling party leaves a message on the answering machine. If the customer on network B subsequently retrieves the message and calls back, whom should we say is the initiator or causer of the call? If the customer on B's network would not have called the customer on A's network but for the voice mail, then we might conclude that the customer on A's network is the initiator or causer of the call, but the customer on B's network is the one who dialed the successfully completed call.

[49] Relaxing this assumption and recognizing that different networks may have different costs does not change the basic results of this analysis nor does it undermine the two COBAK rules. *See* note 53 *infra*.

[50] *See, e.g.,* James M. Buchanan, "An Economic Theory of Clubs," 32 *Economica* 1 (1965) (discussing the differences between private and public goods).

incremental cost in order to encourage efficient consumption decisions.[51] Setting the price equal to incremental cost ensures that the consumer will purchase all units where the benefit he receives equals or exceeds the cost of the resources used to produce the good or service.

58. Where a good or service is jointly consumed by more than one consumer, such as a phone call, the analysis becomes slightly more complicated.[52] In the case of a phone call, for example, efficiency requires both that: (1) the sum of the benefits that both parties to the call receive equals or exceeds the cost of the resources used to produce the call; and (2) the benefit that each party to the call receives equals or exceeds the price that each party paid for the call.

59. If one assumes that the parties to a call benefit equally from the call, then, in order to achieve efficient consumption decisions, each party should pay one-half the incremental cost of the call.[53] If the incremental cost is split equally, then the benefits each party receives will equal or exceed the price he pays, while the total benefits both parties collectively receive will equal or exceed the costs of the resources used to provide the call.

2. Efficient Pricing by Carriers

60. The above analysis suggests that customers would make efficient consumption decisions if they faced retail prices that evenly divided the cost of a call between the parties. The next question thus becomes: what kind of interconnection

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[51] *See, e.g.*, I ALFRED E. KAHN, THE ECONOMICS OF REGULATION: PRINCIPLES AND INSTITUTIONS 65-70 (1970).

[52] *See* James M. Buchanan, *supra* note 50.

[53] There are two possible complications to this analysis that should be noted. Neither complication should change the basic conclusion, however.

First, one needs to consider the implications if the two parties to a call do not benefit equally from the call (in the sense of having identical demand functions). Ramsey analysis suggests that, in that case, one should allocate the cost of each specific call based on the relative elasticities of demand of both parties to the call. Frank Ramsey, *A Contribution to the Theory of Taxation*, 37 ECON. J. 47 (1927); *see also* KENNETH E. TRAIN, OPTIMAL REGULATION: THE ECONOMIC THEORY OF NATURAL MONOPOLY 115-45 (1991). Unfortunately, it is clearly impossible in practice to estimate individuals' demands for specific calls, particularly for recipients of calls. Given this, it appears necessary to develop some general assumptions concerning demand. As the above analysis suggests, it appears more realistic to assume that both parties benefit equally than it is to assume that the calling party is the sole beneficiary of the call. *See also* para. 65 *infra*.

Second, one needs to consider the implications of two networks having different costs. In general a network with higher costs should offer greater services. For example, a mobile wireless network may have higher termination costs than a wireline network, but it offers its customers the advantage of mobility. Similarly, a broadband network may have higher costs, but again it may offer its customers the advantage of additional services. To the extent that differences in cost are due to differences in the features of a network, it appears reasonable to require the party choosing the more expensive network to pay for the additional costs of that network.

pricing regime will give carriers the incentive to set such prices.

61. If there is no inter-carrier compensation, then carriers must recover the cost of termination from their own customers. If there is sufficient competition for end-user customers, then carriers will only be able to charge prices that, on average, just recover these costs. If, on the other hand, there is insufficient competition, then the regulator will have to regulate the prices charged by dominant carriers (*i.e.,* those with individual market power), to ensure the efficient level and structure of end-user charges. The regulator should not have to regulate the rates charged by non-dominant carriers, however.[54] As competition develops, the regulator should be able to relax regulation of all end-user rates.

62. Thus, to the extent that both parties to a call benefit equally from the call, this suggests that the parties should share equally in the cost of the call.[55] Moreover, requiring carriers to recover network costs from their own customers has the added benefit of maximizing the influence of competition on prices.

D. Rationale Underlying the COBAK Rules

63. This section applies the analysis of the previous section in explaining the economic and policy rationale behind each of the COBAK rules. The section first shows how the above analysis directly supports the first rule of COBAK – that carriers recover local access costs from their end-user customers. The section then explains why the second default rule of COBAK – that carriers are responsible for the cost of transporting calls to the called party's local central office – deviates somewhat from the above analysis. Finally, the section explains how the COBAK default rules should lead to efficient and successful negotiations between carriers in the majority of circumstances.

1. Rationale for Rule 1: Why the Costs of Local Access Should Be Recovered from End User Customers.

64. The main rationale for Rule 1 of COBAK follows directly from the above analysis. Specifically, if both parties benefit equally from a call, then they should share equally in the cost of the facilities necessary to provide the call. COBAK's first rule will divide the cost of local access between the calling party and the called party by requiring that each party pay for his own loop and local switching costs.

65. Of course, not every call will equally benefit the calling party and called

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[54] *See, e.g., Policy and Rules Concerning Rates for Competitive Common Carrier Services and Facilities Authorizations Therefor,* CC Docket No. 79-252, First Report and Order, 85 FCC 2d 1, 31-35 (1980) (*Competitive Carrier First Report and Order*) (discussing reasons it is unnecessary to regulate the rates of non-dominant carriers).

[55] As previously noted, there is a slight exception to the general rule that the parties should equally split the cost of the call. Specifically, if one network has higher costs than another because it offers more features, such as mobility, it appears reasonable to require the customer subscribing to, and benefiting from, the more expensive network to pay the higher costs.

party, and, accordingly, no simple, uniform interconnection rule can ensure that the cost of every call will be allocated proportionately to the benefits received by each party to the particular call. Nevertheless, if on average both parties to a call benefit equally, then a system in which the parties share the cost of the call will provide a more efficient cost recovery basis on average than a system in which the calling party bears the entire cost of the call.[56]

66. There are other reasons that justify COBAK's first rule as well. As discussed below,[57] COBAK should: (1) significantly reduce the terminating monopoly access problem; (2) allow carriers greater flexibility to achieve efficient end-user rate structures (rather than rely on per-minute charges to recover inter-carrier charges); and (3) reduce the incentive of carriers to discriminate against off-net calls.

2. Rationale for Rule 2: Why the Calling Party's Network Should Bear the Cost of Transport.

67. The above analysis suggests that, if the parties to a call benefit equally from a call, they should share equally in its costs, including the cost of transport. COBAK's second rule does not require such equal sharing, however. Rather, it requires that the calling party's network bear the entire cost of transport. COBAK's second rule diverges from this theoretical prescription of equal-cost sharing for the reasons explained below.

68. Wherever networks interconnect, each network has an incentive to shift the cost of transporting calls to the other network. Thus, for example, assuming the absence of transport charges, a network would prefer to interconnect at a single point (*e.g.*, a tandem switch), rather than at multiple central offices, and have the called party's network carry the call to the called party. Similarly, where two networks are interconnected at multiple points, the originating network has an incentive to drop the call off as soon as possible on the terminating network, and thus shift as much of the transport cost as possible onto the latter network. One of the main issues that any rule allocating transport costs must address, therefore, is how to minimize free-riding on other carriers' transport networks.

69. There are several potential rules that address this free-rider problem. One such rule would be to require the two networks to split equally the incremental cost of transport. This solution clearly would be consistent with the above analysis favoring the equal sharing of costs.[58] Unfortunately, it raises several problems. First, and most

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[56] *See* Patrick DeGraba, *supra* note 7.

[57] *See* section V *infra*.

[58] A more regulatory approach would be for a regulator to simply announce a default location at which carriers must exchange traffic destined for a specific geographic area on a bill-and-keep basis. Again, such a location would have to be used only as a default for carriers that are unable to reach agreement on interconnection points. *See* Douglas A. Galbi, *supra* note 37. One major problem with this approach is that there is no reason to suppose that the regulator will have the information necessary to select efficient meet point locations.

important, this rule would prove extremely complicated for a regulator to implement. For example, if one network wanted to interconnect at a single point, while the second carrier wanted to interconnect at multiple points, it is not clear how an arbitrator would decide this issue. Furthermore, even if two networks agreed where to interconnect, it is not clear what the incremental cost of transport would be. The following example illustrates this problem. Suppose that network A has several switches connected to a tandem switch, while network B has a single switch. Suppose further that A and B agree to interconnect mid-way between A's tandem and B's switch. In this scenario, the incremental cost of transport is not simply the cost of the transport trunk connecting A's tandem and B's switch. Rather, network A would likely have to increase the capacity of its interoffice trunks and possibly the capacity of its tandem and end-office switches as a result of interconnection; and network B might have to increase the capacity of its single switch. In other words, the incremental transport costs attributable to interconnection are not limited to the cost of the physical trunks linking the two networks, but may also include certain incremental costs of expanding other portions of the network to handle changing traffic patterns. These incremental interconnection costs, however, are likely to be difficult to estimate and subject to considerable debate.

70. In addition, it is not at all clear how one would split transport costs where a call involved three or more networks. While it is possible to imagine a generalization of the "split-the-cost" rule for transport costs where three or more networks are involved, such a rule would likely be complicated and difficult to implement. Moreover, because of its likely complexity, parties might be less willing to accept such a rule.

71. COBAK's second rule – requiring the calling party's carrier to be responsible for the cost of transporting the call to the called party's local central office – offers several significant advantages over the "split-the-cost" approach. First, the rule can be easily implemented if the parties cannot agree. Specifically, the calling party's network can always satisfy Rule 2 by constructing transport facilities to the called party's central office or by leasing transport facilities from another carrier. In addition, as discussed below,[59] it appears reasonable, at least during the introduction of competition into local markets, to require incumbent local carriers to lease transport facilities to interconnecting carriers at regulated rates.

72. Second, unlike the split-the-cost approach, COBAK does not require carriers to agree on the specific routes for an interconnecting transport network. Rather, each network will be free to design its transport network so as to best serve the needs of its customers. For example, in the case of a new entrant interconnecting with an incumbent carrier, the new entrant can decide whether to have dedicated transport trunks to each of the incumbent's central offices or to interconnect at the incumbent's tandem switch and purchase tandem-switched transport. In addition, each carrier can decide the capacity of its dedicated interconnection trunks, which will determine the quality of service provided.

73. The final, and most important, advantage of COBAK's second rule is that it

[59] *See* section VI.E *infra*.

should encourage parties to negotiate between themselves and avoid resorting to the regulator. Specifically, where the two networks both originate and terminate traffic, it generally will be in their mutual interest to negotiate a meet-point interconnection arrangement, since it is generally cheaper to build a single transport trunk than for each individually to construct a separate transport trunk. In other words, because COBAK's second rule does not specify the efficient solution as the default, it increases the incentive of the parties to negotiate the efficient solution.

74. It should be noted that, where one of the networks exclusively (or primarily) receives traffic, COBAK may not result in a negotiated bill-and-keep arrangement. In that case, because the one-way network will not be delivering traffic, it will not need to build its own transport facilities under the default rule, and therefore will have no incentive to share the cost of a meet-point arrangement. It is not clear how significant a problem this will prove in practice, however. First, most networks do originate some traffic, and to the extent they do, they will have an incentive to negotiate some cost-sharing arrangement. Second, although COBAK does not solve this problem, it still represents an improvement over the existing reciprocal compensation regime, where one-way networks not only do not have to share the cost of transport, but also are paid to terminate incoming traffic. At least, COBAK eliminates the uneconomic incentive created by existing termination charges. Finally, as discussed below, additional remedies can limit the extent to which "receive-only" networks can impose transport costs on other networks.[60]

V. EXISTING INTERCONNECTION PROBLEMS SOLVED BY COBAK

75. The previous section outlined the theoretical and policy justifications for the COBAK proposal. This section discusses a number of serious problems affecting existing interconnection regimes that COBAK either eliminates or ameliorates.

A. Problems of Regulatory Arbitrage

76. Perhaps the most important problems facing existing interconnection regimes are the several opportunities for regulatory arbitrage that they create. The two most important arbitrage opportunities, in dollar terms, are discussed below.[61]

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[60] *See* section VI.B *infra*.

[61] There are other sources of regulatory arbitrage as well. For example, large end users may employ Private Branch Exchange ("PBX") on their premises. In some cases, such PBX customers may also employ leased lines to connect multiple PBX's at distant locations (such as at different regional offices). These leased lines permit employees to call other employees at remote offices without incurring access charges. In some private networks, however, employees can also place "off-net" calls that traverse the leased line and then "hop off" onto the local exchange network. Because these off-net calls are treated like any other call from the PBX, access charges do not apply. This problem of the "leaky PBX" caused a sufficient erosion in access charges that the Commission imposed a $25 per month charge for each leased trunk that could "leak" traffic into the public switched network. *See* 47 C.F.R. § 69.115. *See generally MTS and WATS*

1. Access Charge Arbitrage

77. One source of arbitrage arises from the disparate treatment of interexchange and local telephone calls. Under current regulations, the calling party's LEC collects originating access charges from its customer's pre-subscribed IXC when that customer makes a long-distance call. Because the IXC passes on such charges in higher per-minute long-distance charges, the calling party, in making a long-distance call, effectively (if indirectly) pays his LEC for the local facilities used on a per-minute basis. In contrast to the access regime, customers in most parts of the country can purchase unlimited local calling on a flat-rated basis (*i.e.*, there is no per-minute charge for originating local calls).

78. These rules create an arbitrage opportunity for providers of IP telephony services that is likely to become significant as the quality of IP telephony improves.[62] In particular, through the enhanced services exemption, the IP telephony provider generally does not have to pay originating access charges to the calling party's LEC. Thus, if a customer can reach its ISP by dialing a local call, it can then use an IP telephony provider to make long-distance calls and avoid originating (and possibly terminating) access charges. This arbitrage opportunity arises because, for long-distance calls, the calling party pays local access on a per-minute basis, while, for local calls, the calling party typically pays for the same access on a flat-rated basis.

79. Moreover, this opportunity for regulatory arbitrage is exacerbated if the ISP is a customer of another local exchange carrier. In that case, when the calling party makes a long-distance call using IP telephony, not only does the calling party's LEC *not* receive originating access charges; it also must pay a termination charge to the ISP's LEC.

80. COBAK eliminates this disparate treatment of local versus long-distance calls by requiring the calling party's LEC, in both cases, to recover its local access and transport costs from its end-user customer. Moreover, under COBAK, neither the IXC nor the ISP's LEC can charge the calling party's LEC for termination. Thus, COBAK eliminates any non-economic, regulation-induced incentive to choose an IP telephony provider over a traditional IXC, because customers face the same cost recovery mechanism for local access. Under COBAK, therefore, any differences in the cost of a long-distance call provided by a traditional IXC, compared with that provided by an IP telephony provider, should be based on the relative efficiencies of the carrier's networks and operations, which (along with the quality of service provided) is precisely the

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Market Structure, CC Doc. No. 78-72, First Reconsideration Order, 97 FCC2d 682 (1983), Second Reconsideration Order, 97 FCC2d 834 (1984). This charge was designed to compensate the LEC, at least partially, for the loss of regular access charges that would have applied if the call were handled as a regular long-distance call. COBAK should reduce this problem just as it reduces the problem of IP telephony arbitrage discussed in the text.

[62] It appears that the current inferior quality of IP telephony, compared with circuit-switched long-distance service, combined with reductions in per-minute access charges, has limited somewhat the shift to IP telephony in this country. Expected quality improvements in IP telephony are likely to accelerate the erosion of access revenues, however.

criterion on which a customer should choose a carrier.

2. ISP Reciprocal Compensation Problem

81. A second source of regulatory arbitrage arises from the fact that, under the Commission's existing rules, the calling party's LEC generally must pay termination charges for local traffic terminating on another LEC's network,[63] and that these termination charges generally are above-cost or inefficiently structured. Because of this, certain CLECs have targeted as customers ISPs and other entities that primarily receive calls in order to generate unbalanced traffic flows and thus collect termination revenues from incumbent LECs. This problem is frequently referred to as the "ISP reciprocal compensation problem." Exacerbating this problem is the fact that, given the prevalence of flat-rated local service, incumbent LECs generally are unable to recover their termination costs from their customers who cause them.

82. Another problem, closely related to the ISP reciprocal compensation problem, is the problem of "one way" networks. Under the existing reciprocal compensation regime, a business that primarily receives calls has an incentive to claim to be a network. More specifically, instead of purchasing business lines from a LEC, such a business has an incentive to install a switch and claim to be a network in order collect termination charges for all the calls it receives. The difference between the two problems is that the ISP reciprocal compensation problem concerns the incentives of carriers to seek customers that primarily receive traffic, whereas this problem concerns the incentive of an entity to claim to be a carrier, rather than a customer, in order to avoid having to pay for a business line.

83. By eliminating termination charges, COBAK significantly reduces the ISP reciprocal compensation problem and the one-way-network problem, while at the same time freeing regulators from having to determine the economically efficient level and structure of termination charges. Thus, under COBAK, carriers will not be able to earn large profits by targeting customers that receive more minutes of traffic than they originate. It should be noted, however, that COBAK will not completely eliminate the incentive of a business that primarily receives calls to claim to be a network. Specifically, because COBAK requires the calling party's network to deliver the call to the local central office (or switch) of the called party, a business that primarily receives calls may still claim to be a network so that the calling parties' LECs will have to transport calls without charge to the business's switch. Under that scenario, the business may be able to avoid having to pay a retail end-user rate for a business line.

3. Inefficient Facilities Investment Resulting from Regulatory Arbitrage

84. The arbitrage opportunities discussed above not only cause significant rent transfers between carriers, they can also create incentives to invest inefficiently. In particular, carriers may have an incentive to invest, or not to invest, in a particular

[63] *See Local Competition First Report and Order*, 11 FCC Rcd at 16008-58, paras. 1027-1118.

technology because of the favorable regulatory treatment the technology receives, rather than because it minimizes the cost of providing service.

85. For example, the existence of a per-minute termination charge may deter certain competitive carriers from cooperating with incumbent carriers in adopting compatible packet-based technology that more efficiently handles data traffic. A network that receives more traffic than it delivers may be unwilling to adopt compatible technology, because doing so may reduce its revenues from reciprocal compensation. More specifically, time is the incorrect way to measure usage, or congestion, on packet-based networks, and terminating packet-based networks may not even be able to measure and bill the time a particular customer has been online. Because the use of per-minute termination charges appears to be incompatible with the use of packet-switched technology, carriers that terminate more traffic than they originate may well refuse to cooperate with other carriers in jointly adopting compatible packet-based technologies if this means that they will lose reciprocal compensation revenues.

86. The one-way-network problem generates similar incentives to invest inefficiently. Specifically, under the reciprocal compensation regimes adopted by the vast majority of states, networks that primarily receive calls are entitled to charge for termination, while business customers that primarily receive calls must simply pay a carrier for business lines. As previously noted, this dichotomy creates an incentive for a business that primarily receives calls to purchase a switch, self-provide dial tone, and claim to be a network in order to be able to charge termination fees for all the calls it receives.

87. COBAK reduces these incentive problems in at least two ways. First, COBAK is technology neutral; it applies the same rules regardless of the technology a carrier uses. This reduces the likelihood that a carrier will choose a less efficient technology solely because it receives more favorable regulatory treatment. Thus, COBAK gives carriers the incentive to use the technology that provides services at the least cost. Second, by eliminating per-minute termination charges, COBAK eliminates any incentives for carriers to invest inefficiently. In particular, COBAK reduces incentives arising from the ISP reciprocal compensation problem and the one-way-network problem.

88. It should be acknowledged that COBAK does not solve all the incentive problems, however. Specifically, there remains a small incentive under COBAK for an entity to claim to be a network rather than simply subscribe as a customer. If an entity can qualify as a network, it can avoid paying business line rates (and, as a carrier, be entitled to have calls transported to the business's switch). Nevertheless, such incentives exist today under the current interconnection regime, and this incentive is less than if the entity could also claim per-minute termination charges. Thus, COBAK does not introduce any new distortions.

B. Monopoly Power over Terminating Access

89. The current requirement that carriers pay the called party's network to

terminate calls confers monopoly power on the called party's network with respect to terminating access. This market power arises from the fact that the calling party's carrier, whether a local carrier or an IXC, has no alternative carrier that can terminate a call to a particular called party. Thus, the calling party's carrier must pay the terminating network whatever price it demands in order to reach the called party. In effect, each terminating carrier, no matter how small, has a monopoly over termination to its own customers. Recently in fact, IXCs have begun to complain that certain CLECs have exploited their monopoly power in termination by setting access charges that far exceed those charged by major incumbent LECs.[64]

90. This problem presents regulators with the unattractive choice of allowing non-incumbent carriers to exercise their terminating market power, which could raise retail prices and reduce network usage, or regulating the terminating access rates of all carriers, even those that would not possess market power under alternative interconnection regimes.[65] COBAK eliminates this problem by requiring a carrier to recover its termination costs from its own end-user customers. To the extent that a carrier faces competition from other carriers for end users, it will not have monopoly power over termination, since any attempt to charge above-cost rates is likely to cause it to lose customers to competing carriers. In the case where there is no competition for end users, the incumbent LEC's local rates would be regulated, as they traditionally have, and the issue of how to recover local access costs would simply be folded into the rest of the local rate regulation process. Thus, COBAK eliminates the need for regulators to set prices for termination.

C. The Problem of Estimating Interconnection Costs

91. An additional problem with the existing CPNP regime is that it requires regulators to set both the level and structure of interconnection rates. This is a difficult task for a regulator, made even more difficult by the fact that incumbent LECs possess the relevant information but have incentives not fully to disclose the information. More specifically, as previously discussed, incumbent LECs have an incentive, at least in the case of access charges, to report as high a cost (whether historical or forward-looking) as possible for their regulated services. For example, where the termination rate is based on the cost of switching, incumbent LECs may have an incentive to overstate both their direct costs of switching and the overheads that are to be allocated to switching. Setting reciprocal compensation rates (*i.e.*, rates for two-way access) raises related, but slightly different, issues.

92. It is also extremely difficult for regulators to set an efficient rate *structure*.

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[64] *See, e.g., Pricing Flexibility Order and NPRM*, 14 FCC Rcd at 14316-17, para. 186 (discussing AT&T's petition for declaratory ruling that complained of excessive CLEC access charges).

[65] *Id.* at 14312-20, paras. 180-89. *See also* JEAN-JACQUES LAFFONT & JEAN TIROLE, *supra* note 11 at 186 (discussing "common fallacy" that small players do not have market power and should therefore face no constraint on their termination charges). In fact, carriers with smaller market shares may have a greater incentive to charge excessive terminating access charges because those charges are unlikely to be flowed through to interconnecting carriers' end-user prices. *See id*.

Economists have long recognized that the efficient way to recover the cost of "congestible" or "traffic-sensitive" shared facilities, such as switches and transport trunks, is to adopt peak-load pricing.[66] Unfortunately, because of the practical difficulties of developing peak-load prices,[67] regulators, including the Commission, have tended to adopt per-minute pricing that attempts to recover the average cost of the congestible facility.[68] This means, however, that prices will be too high during off-peak periods and too low during peak periods. In addition, carriers have an incentive to overstate their termination costs to regulators in order to obtain a higher termination rate in the case of one-way access or in situations where the regulator sets individual termination rates for each carrier based on that carrier's costs.

93. COBAK eliminates both the need for regulators to set termination rates and the incentive of a carrier to overstate its termination costs. Specifically, by requiring carriers to recover the cost of local access from their end users, COBAK allows the workings of the competitive market to discipline the way that LECs recover local access costs. Once competition develops, if a carrier sets prices that more than recover the costs of serving a customer, a competing carrier is likely to lure the customer away by charging a lower price that better reflects the true cost of serving the customer. Similarly, if a carrier adopts an inefficient rate structure, it likewise risks losing customers to carriers that have adopted an efficient rate structure.

D. Retail Rate Inefficiencies Caused by Interconnection Rates

94. The existing interconnection regimes, particularly CPNP regimes, create certain inefficiencies that will tend to result in inefficient retail rates. Such inefficient retail rates can result in inefficient usage of the network and can distort customer choices among competing local carriers.

95. One source of inefficiency is that existing termination charges create an "artificial" per-minute cost structure for carriers that will tend to result in inefficient per-minute retail prices. In unregulated, competitive markets, such as the markets for CMRS services and Internet access services, retail pricing is moving away from per-minute

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[66] *See, e.g., Local Competition First Report and Order*, 11 FCC Rcd at 15878, para. 755 ("[A]s a matter of economic theory, . . . if usage-sensitive rates are used, then somewhat higher rates should apply to peak period traffic, with lower rates for non-peak usage. The peak load price would be designed to recover at least the cost of the increment of network capacity added to carry peak period traffic."). *See also* I ALFRED E. KAHN, *supra* note 51 at 89-103.

[67] In the *Local Competition Proceeding*, the Commission described some of the practical difficulties associated with peak-load pricing, including the fact that different geographic areas (such as downtown business areas compared with suburban residential areas) could experience peak volumes at different times, that such peak periods could shift over time (*e.g.,* due to increasing Internet usage), and that peak load pricing could cause peak period traffic to shift to off-peak periods. *See Local Competition First Report and Order*, 11 FCC Rcd at 15878, para. 756. *See also LEC-CMRS Interconnection NPRM*, 11 FCC Rcd at 5041-42, paras. 44-45 (discussing practical difficulties in setting peak-load interconnection rates).

[68] *See, e.g., Local Competition First Report and Order.*, 11 FCC Rcd at 15878-79, paras. 756-57 (declining to require states to impose peak-load reciprocal compensation rates).

charges and towards flat charges or two-part tariffs that guarantee a certain number of free minutes. This suggests that few costs are incurred on a per-minute basis, and that flat-rated pricing will lead to more efficient usage of the network. The existing reciprocal compensation scheme, which requires the calling party's network to pay usage sensitive termination charges to the called party's network, imposes an "artificial" per-minute cost structure on carriers which, if retail rates are unregulated, will likely be passed through to customers in the form of per-minute retail rates. Such usage sensitive rates thus would likely reduce usage of the network below efficient levels.[69]

96. COBAK solves this problem by eliminating per-minute termination charges, which in turn eliminates the artificial per-minute marginal cost of calling. In other words, COBAK eliminates any artificial usage-based costs that result from regulation. To the extent that retail rates are unregulated (for at least some carriers), this should lead to more efficient retail rates.

97. A second inefficiency caused by inter-carrier termination charges is that they create an artificial cost difference between on-net and off-net calls. Specifically, termination charges will cause carriers to have a higher effective cost for completing off-net calls than they have for completing on-net calls.[70] This cost differential will lead to several types of inefficient behavior.

98. If retail rates are *not* regulated, then this cost difference will tend to cause carriers to charge a higher price for off-net calls than for on-net calls. This in turn will create an incentive for customers to choose their network based, at least in part, on the customers that currently subscribe to the particular network, rather than on the basis of which network most efficiently meets his/her needs. This network externality not only will cause some customers to choose a network that they otherwise might not, but it could also increase the tendency of telecommunications markets to tip into monopoly, as larger

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[69] The ISP market illustrates the importance of rate structure on usage. When AOL changed from usage sensitive rates to a flat charge for unlimited usage in late 1996 the number of customers and the usage per customer rose dramatically and other competitors soon followed. *See, e.g.,* Kevin Coughlin, *AOL Logs on to Profits – Added Gear Revives Online Giant,* THE STAR LEDGER (May 18, 1997); Phil Waga, *AOL Smooths Out Problems, Readies New Features,* GANNET NEWS SERVICE (June 5, 1997). In addition, many believe that the main reason that Internet usage and penetration is lower in Europe than in the United States is because local service is priced on a traffic-sensitive basis in Europe, while it tends to be priced on a flat-rated basis in the United States. As a result, European regulators are considering how to offer flat-rated Internet access services. *See, e.g.,* Office of Telecommunications, Determination of a Dispute between BT and MCI Worldcom Concerning the Provision of a Flat Rate Internet Access Call Origination Product (FRIACO) (rel. May 26, 2000) (U.K. regulator requires incumbent LEC to offer flat-rated option to competitive ISPs); *Regulators Tell DT To Offer ISP's Flat-Rate Connections,* TELECOMMUNICATIONS REP., Nov. 20, 2000 at 23 (German regulator requires incumbent LEC to offer flat-rated option to competitive ISPs). Similarly, the introduction by CMRS providers in the United States of pricing plans that include "buckets" of minutes appear to have contributed significantly to the growth in wireless usage.

[70] More precisely, assuming that the LEC has the same average transport costs for on-net and off-net calls, the carrier can recover the transport cost of an on-net call from both parties to the call, whereas, in the case of an off-net call, it must recover the entire transport costs from the calling party.

networks will have a relative advantage in attracting new customers.[71]

99. If, on the other hand, retail rates *are* regulated, inter-carrier termination fees will cause a different type of inefficiency. In particular, if regulations require that termination costs be recovered from all customers equally, then CPNP termination will force a carrier's customers that do not make off-net calls to contribute to the cost of the facilities of other networks and to subsidize the carrier's customers that do make off-net calls. [72]

100. Again, COBAK substantially solves this problem, regardless of whether retail rates are regulated. By eliminating inter-carrier termination charges, COBAK eliminates any *artificial* cost differential between off-net and on-net calls.[73] This, in turn, will reduce the incentive of non-rate-regulated LECs to charge different prices for off-net and on-net calls.[74] In the case of rate regulated carriers, on the other hand, COBAK will reduce the ability of one network to impose its network costs on another network's customers.

101. A final possible inefficiency of the existing interconnection regime is that the inter-carrier interconnection charges may be used to facilitate oligopolistic collusion. More specifically, competing local networks may agree on above-cost interconnection charges in order to justify higher end-user prices.[75] Again, COBAK solves this problem by eliminating per-minute termination charges. Thus, under COBAK, carriers have no ability to collude by agreeing on above-cost interconnection charges.

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[71] *See,* Patrick DeGraba, *supra* note 7.

[72] To illustrate this, suppose that there are two networks – an incumbent LEC network and a CLEC network. Suppose further that the CLEC's only customer is an ISP that only receive calls from the ILEC's network. In this case, if the termination charge for the CLEC's network equals the per-minute cost of its switch, then the CLEC network would recover the entire cost of the switch through termination charges. Thus, customers of the ILEC's network will pay for the entire cost of the CLEC's switch.

[73] COBAK will not completely eliminate the cost differential between on-net and off-net calls, however. In the case of an on-net call, the carrier can split the cost of transport between the calling and called parties. In the case of an off-net call, however, the calling party's carrier, which bears the entire cost of transport, can only recover that cost from its own end-user customer. Thus, if the COBAK default is employed, the calling party's carrier is likely to view an off-net call as somewhat more expensive than an on-net call. If, as appears likely, however, carriers negotiate a meet-point arrangement in which they split the transport costs, this should reduce any cost differential.

[74] Of course a carrier may still choose to offer different rates for off-net and on-net calls as a marketing device. In a competitive market, however, such pricing would tend to survive only if it were efficient. The important point is that such rates are not induced by the regulatory regime.

[75] JEAN-JACQUES LAFFONT & JEAN TIROLE, *supra* note 11 at 190-95.

VI. IMPLEMENTATION ISSUES FOR COBAK

102. Like any other interconnection regime, COBAK raises a number of implementation issues which would have to be resolved before COBAK could be adopted. Several of the more important issues are discussed below.

A. Identifying Central Offices

103. COBAK's second rule makes the calling party's carrier responsible for the cost of transporting the call to the called party's central office. This raises two separate implementation issues concerning the location of central offices. First, to the extent that there is any uncertainty concerning which facilities qualify as a central office, this rule will give networks an incentive to claim that their central offices are as close to the end-user customer as possible. Second, and relatedly, this rule may cause networks to locate their central offices inefficiently. These issues are discussed in this and the next sections.

104. To illustrate the first issue, consider a traditional wireline carrier that employs digital-loop-carrier ("DLC") technology.[76] The DLC electronics typically are installed in a remote terminal ("RT") located somewhere between the central office and the customers' premises. All else being equal, such a carrier would rather have the RT declared a central office than the switch to which it is connected. Although this issue is not likely to prove a significant problem for existing network technologies, it could prove a problem as new technologies are developed and deployed.

105. It thus appears reasonable to adopt rules defining those points in a given network that qualify as central offices for purposes of COBAK. One approach would be to define the central office or local switch in terms of certain observable attributes. For example, one could define the central office as the node at which loops: (1) are aggregated, and (2) gain access to the transport network. The definition, of course, raises the question of what is meant by the phrase "gain access to the transport network."

106. A second approach would be to define a central office as a node that interconnects and exchanges traffic with other equivalent nodes. Under this definition, remote terminals would not be considered central offices because they do not exchange traffic with other remote terminals. Rather, remote terminals aggregate traffic for the purpose of carrying that traffic to the central office, which provides local switching. Alternatively (or additionally), one might define a central office as a node at which other networks can interconnect.

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[76] In a digital-loop-carrier system, "analog signals are carried from the customer's premises to a remote terminal (RT), at which they are converted to digital information, multiplexed with other signals, and transported, generally through fiber facilities, to the LEC central office." *Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket Nos. 98-147, 96-98, Third Report and Order in CC Docket No. 98-147 and Fourth Report and Order in CC Docket No. 96-98, 14 FCC Rcd 20912, 20945-46, para. 69 n.152 (1999) (*Line Sharing Order*).

107. An alternative approach would be to specify that, in order qualify as a central office, a node must connect a minimum number of customers (*e.g.*, 50,000). A similar approach would be to declare that any node within a specified distance of the called party (say, 15 miles) could be treated as the central office for purposes of COBAK.

108. Despite the abstract difficulties in defining the local central office, this does not appear to present an insurmountable problem in practice. First, as previously mentioned, there appears to be general agreement as to what constitutes a central office for today's wireline technology.[77] Second, it appears likely that networks will generally negotiate one or more meet points for exchanging traffic on a bill-and-keep basis, particularly where each network both originates and terminates traffic. They will find it in their mutual interest to so agree because they each can then avoid individually having to bear the cost of transport facilities to multiple end offices.

B. The Problem of Remotely Located Central Offices

109. Another implementation issue involving central offices is who should bear the cost of transport where the called party's network locates its central office switch in a remote location, such as outside the local calling areas.[78] Thus, for example, if both parties to a call live within the same local calling area, but the switch serving the called party is located in another state, should the calling party's network be forced to bear the cost of transporting the call to the called party's switch?[79] Note, in this regard, that this problem is likely to be significantly greater where the called party's network only receives traffic.

110. One way to deal with this problem, at least for incumbent LECs subject to retail rate regulation, would be through adjustments in retail end-user rates (competitive LECs clearly could implement this solution on their own). Thus, a regulator might allow the incumbent LEC to impose toll charges whenever its customers called customers served by remotely located central offices. To the extent that calling parties then complain to customers of the network with the distant central office, those customers might consider changing carriers so that friends and neighbors could call them without incurring toll charges. This potential loss of customers might thus induce the network with the remote central office to negotiate points of interconnection within a local calling

[77] Similarly, most would agree that the mobile telephone switching office ("MTSO") should qualify as the central office for a wireless network.

[78] This issue is a specific manifestation of the more general problem of whether COBAK, or any alternative interconnection regime, creates incentives for networks to deploy the efficient number of switches and to locate them efficiently. For example, one might also ask whether a particular regime creates appropriate incentives for carriers to choose the efficient number of central office and tandem switches to include in its network. While the more general question is beyond the scope of this paper, it appears that COBAK is likely to create fewer incentives to engage in inefficient investment than the current CPNP regime, for it eliminates inter-carrier termination payments.

[79] A similar problem arises in wireless networks, where a single MTSO may serve a very large geographic area. In that case, the question becomes whether wireline networks should be responsible for building transport facilities to the wireless network's MTSO.

area and to bear the cost of such "remote transport" itself. On the other hand, this solution may not be effective if the calling parties do not complain to the called party, or if the called party does not care about the toll charges others may pay.

111. A second approach would be to require the network with a remotely located switch to provide points of interconnection within a local calling area. Under this approach, each such point of interconnection would be treated as the called party's central office when the network with the remote switch receives calls from another network. This is similar to the practice of wireless carriers of establishing points of interconnection in local calling areas in order to avoid having calls to their network classified as a toll call.

112. Two final points are worth noting. First, as previously mentioned, this problem of remotely located central offices is likely to be particularly acute for networks that primarily or exclusively terminate traffic. Because, under COBAK, such "receive-only" networks are not responsible for the cost of transporting traffic they receive from other networks, they have no incentive to locate their central offices in a manner that minimizes the total cost of building transport facilities. The two approaches suggested above should mitigate these problems, however. For example, a paging company may have difficulty attracting customers if parties seeking to page those customers must incur a toll charge. Second, although COBAK does not completely eliminate incentives of carriers to locate central offices inefficiently, it certainly does not exacerbate the problem as compared with the existing CPNP interconnection regime. This is due to the fact that the calling party's network is responsible for the entire cost of transport under the current CPNP regime, just as it would be under COBAK.

C. Distinguishing Between Carriers and End-User Customers

113. A third implementation issue is whether COBAK, or any other interconnection regime, creates incentives for end-user customers to claim to be an interconnecting network. This "sham network" problem clearly exists under the current interconnection regime. Specifically, a business today, particularly if it primarily or exclusively receives calls, may have an incentive to claim to be a network instead of an end-user customer in order to: (1) receive reciprocal compensation payments; and (2) avoid paying business line rates to be connected to the incumbent's network.[80] Thus, for example, although the Commission, in the *Local Competition Order,* concluded that paging companies were local exchange carriers entitled to reciprocal compensation under section 251(b)(5),[81] ILECs have argued that they should not be required to transport calls,

[80] In addition, an entity may claim to be a network in order to qualify to lease unbundled network elements from an incumbent LEC. *See* 47 U.S.C. § 251(c)(3) (requiring an incumbent LEC to offer nondiscriminatory access to network elements on an unbundled basis to "any requesting telecommunications carrier").

[81] *Local Competition First Report and Order,* 11 FCC Rcd at 15997, para. 1008.

or to pay reciprocal compensation, to paging companies.[82]

114. COBAK significantly reduces this "sham network" problem. Specifically, by eliminating termination charges, COBAK eliminates the possibility that the interconnection regime could become a "money pump" for the business claiming to be a network.

115. COBAK does not entirely eliminate the incentive for a business that only receives calls to claim to be a network, however. In particular, if such a business can qualify as an interconnecting network, then the originating network will be responsible for the cost of transport to that business's switch, and the business can avoid having to pay a subscription fee (*i.e.*, purchase business service from the interconnecting carrier). For this reason, it seems reasonable to require some showing that the business claiming to be a network exhibits characteristics of a network, such as ownership of a switch.

116. Whether COBAK's inability to solve completely this "sham network" problem will pose a significant problem in practice is unclear. It may be that the costs of qualifying as a network, such as purchasing a switch or interconnecting with the incumbent's signaling system, may be sufficiently high as to render this problem a mere curiosity. What is clear, however, is that COBAK reduces the problem significantly, compared to the incentives that exist under the current CPNP regimes.

D. Accounting for "Unwanted" Calls

117. Much of the analysis of this paper assumes that the called party benefits from received calls and therefore should share in the cost of such calls. To the extent that implementation of COBAK results in the assessment of per-call or per-minute charges on the called party, the issue arises as to how to protect called parties from being charged for unwanted calls, such as calls from a telemarketer received during dinner. Note that this would not be a problem if the called party's carrier decided to recover local access costs through flat charges rather than per-minute or per-call charges. If, as suggested above, competition will tend to generate flat-rated end-user charges, rather than per-minute or per-call charges, this problem accordingly will not arise.

118. Even if there are per-minute end-user rates, unwanted calls do not appear to pose a significant problem, provided that the called party actually answers the phone and participates in the call. In this case, if the called party does not want to talk to the calling party, he can simply hang up, thus avoiding continuing termination charges. This should significantly limit the amount of per-minute charges for which the called party may be liable. Alternatively, carriers could agree (or could be required) not to charge their customers for the first minute of a received call. This incoming "free minute" would give called parties the opportunity to identify the calling party and decide whether they wish to continue the call.[83] Finally, parties, using caller-ID or similar devices, could

[82] *See, e.g., TSR Wireless, LLC v. U S West Communications*, File Nos. E-98-13 *et al*., Memorandum Opinion and Order, 15 FCC Rcd 11166 (2000).

[83] It should be noted that many wireless companies offer this service today.

screen their calls to avoid incurring unwanted termination charges.

119. This issue could prove a bit more problematic for calls where the called party does not actually answer the phone. For example, if the calling party left a message on an answering machine or delivered an unsolicited fax, then the called party might be charged for termination without affirmatively accepting the charges. In addition, it is possible that parties may receive large unsolicited e-mails that, when downloaded, could tie up a telephone circuit for several minutes. Although it is not clear how significant a problem this may become, the last example suggests that it may become necessary, or advisable, to develop the technical capability to stop the transmission of large data files beyond the local central office, until the called party affirmatively approves the download.[84]

E. Determining Transport Rates

120. While COBAK makes the calling party's carrier responsible for the cost of transporting the call to the called party's local central office, it does not specify how the calling party's carrier should arrange for the transport of the call. Thus, while some carriers may construct their own transport network, others may lease transport facilities from other parties, including the incumbent LEC. The issue then arises whether regulators need to constrain in some way the lease rates charged for such transport facilities.

121. If there are a sufficient number of alternative providers of transport facilities, regulation should be unnecessary, for competition will drive the price or transport toward economic cost. If, however, the only provider of transport facilities is the incumbent LEC, then there is cause for concern, because the incumbent LEC may have an incentive to charge high prices for transport in order to deter entry. In such a case, it will be necessary to regulate the price that incumbent LECs charge for transport facilities, at least until competition renders such regulation unnecessary.[85] This regulation should be less extensive than what is currently required under the existing interconnection regime (which also regulates the rates charged for terminating switching), and moreover, should be able to be lifted as competition develops in the transport market.

F. Regulation of End User Charges

122. That COBAK eliminates most existing inter-carrier charges, and instead

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[84] In fact, certain ISPs currently do just this when they merely notify customers that an e-mail has been received, but do not download the e-mail until the customer affirmatively opens the e-mail message.

[85] In the *Local Competition Proceeding*, the Commission identified transport facilities as a network element that must be provided to requesting carriers on an unbundled basis. *See Local Competition First Report and Order*, 11 FCC Rcd at 15714-22, paras. 428-51; *Local Competition Third Report and Order*, 15 FCC Rcd at 3840-66, paras. 319-80. The Commission has also indicated, however, that it will relax or eliminate regulation of transport rates as competition develops. *See Pricing Flexibility Order and NPRM*, 14 FCC Rcd 14221.

requires carriers to recover those costs from their end users, raises the general issue of whether it is necessary or appropriate to regulate the way in which carriers recover those costs from their end users. In particular, it raises the following two questions: First, under what conditions is it necessary to regulate the level or structure of end-user rates? Second, should LECs be allowed to charge end users different fees depending on whether the call terminates on or off the originating LEC's network? These issues are discussed briefly below.

1. The Need for Regulation of LEC End-User Charges

123. As previously explained, if COBAK were adopted, it would eliminate much of the revenues LECs currently receive from inter-carrier charges. Specifically, it would eliminate all originating access charges (both interstate and intrastate) and any terminating access charges that currently recover the cost of the loop and local switch. In addition, it would eliminate any revenues that LECs with unbalanced traffic receive from reciprocal compensation. Instead, under COBAK, LECs would recover the costs of these network facilities from their end users. The question then becomes: is it necessary to regulate the charges the LECs impose on their end users, or alternatively, for which carriers is it necessary to regulate such charges?

124. The answer to this question is clear, and already has been adopted. And it is the same answer that the Commission adopted when it opened the long-distance market to competition. Specifically, regulation of end-user rates is necessary and appropriate where a LEC is a dominant carrier (*i.e.*, possesses individual market power), but is unnecessary if a LEC is non-dominant (*i.e.*, does not possess individual market power).[86] Thus, it appears appropriate to extend rate regulation of incumbent LECs, where the LEC already is regulated, to the recovery of these costs, while it appears unnecessary to regulate the rates of carriers whose end-user rates are not currently subject to regulation. Moreover, as competition develops and erodes the market power of incumbent LECs, it should be possible to eliminate all regulation of end-user rates.

125. It is important to recognize that shifting the recovery of these costs from carriers to end users should not, on average, increase the total costs faced by end users. This is so because carriers that currently pay inter-carrier charges, like long-distance carriers, pass these costs on to end-user customers in the form of higher rates. Thus, although a customer may see an increase in the bill he receives from his LEC, he should see a corresponding decrease in other charges, such as lower charges from his long-distance carrier. Of course, to the extent that the existing interconnection regime (and the current geographic averaging requirement for long-distance carriers) involves implicit subsidies, a shift to COBAK may result in some shift in costs among specific groups of consumers, such as raising slightly the costs of customers in high cost areas. Any undue additional burden, however, should be able to be addressed through targeted universal service or other support.

126. Finally, although this paper does not attempt to address the legal issues

[86] *See Competitive Carrier First Report and Order*, 85 FCC 2d 1.

associated with the COBAK proposal, it is worth noting that COBAK could be implemented relatively easily. For example, the Commission, which has jurisdiction over interstate access charges, could simply adopt rules requiring that access charges currently assessed on IXCs instead be charged to the end user. Similarly, the state commissions could simply transfer the current intrastate access charges from IXCs to end users. Of course, it seems reasonable that both sets of regulators should reassess the rate structure of existing access charges before shifting them to end users.

2. Discriminatory End-User Rates

127. Regardless of the prevailing interconnection regime, a LEC may want to impose different end-user charges for different types of traffic. For example, while a LEC may offer unlimited calling within a specified geographic area for a flat monthly fee, it may wish to charge an additional fee when a customer calls a party outside that specified local calling area. Similarly, a LEC may want to charge a higher fee when a customer calls someone on another carrier's network. Finally, in order to encourage its customers to use its own interexchange affiliate or Internet service provider, a LEC might want to charge a customer an additional fee if the customer subscribed to a competing interexchange carrier or Internet service provider.

128. As a general matter, the issue of whether to permit discriminatory end-user charges is more of a competition or antitrust concern, rather than an interconnection concern *per se.* In other words, the real issue is whether specific instances of price discrimination constitute anti-competitive behavior, or whether they simply reflect an efficient method for recovering costs.[87]

129. If the relevant telecommunications market is sufficiently competitive that there is no dominant carrier, then permitting differential charges is not likely to cause a problem. Thus, for example, a LEC that attempted to charge its customers a usage fee, when connecting to a specific ISP, that was not cost-justified would likely find this strategy to be unprofitable. Specifically, if the market were sufficiently competitive, competing firms would offer equivalent interconnection at a lower charge and steal the first LEC's customers. Thus, if there is sufficient competition, it is unlikely that a single carrier could cause a competitive harm or hurt consumers by charging an above-cost fee.

130. Permitting a dominant firm to price discriminate in this manner could have anti-competitive consequences, however. For example, if a dominant LEC offered a complementary service, such as Internet service, for free, while charging customers that use a competing Internet service provider, this could competitively disadvantage competing Internet service providers. It is worth reiterating, however, that this is not an interconnection concern. This issue of the competitive effects of discriminatory end-user

[87] It should be noted that numerous examples of price discrimination can be found in competitive markets. For example, airlines typically charge significantly different prices for identical seats on the same or a similar flight, with the variation in price depending on such factors as how far in advance the customer books the flight, whether the passenger is staying over on a Saturday night, and whether the passenger is a member of the airline's frequent flyer club.

pricing arises regardless of the interconnection regime.

131. Although this issue of how to prevent the anti-competitive use of price discrimination is beyond the scope of this paper, it is worth noting that there are a number of different ways to address this problem. One simple approach would be to provide interconnecting carriers the option to avoid such discriminatory pricing. Specifically, if, for purposes of receiving calls, an interconnecting network agrees to bear all of the cost of transport between the central office of the calling party and that of the called party, then the calling party's network would not be able charge its customers an additional charge for calling customers of the interconnecting network.

132. Finally, it is worth reiterating that this problem of anti-competitive price discrimination can arise regardless of the particular interconnection pricing regime. Nevertheless, as competition is introduced among networks, this problem surely will become more significant, and regulators need to be alert to this possible problem.

VII. CONCLUSION

133. The existing patchwork of interconnection regimes has evolved over time in response to regulatory and service distinctions and multiple, evolving policy goals. Unfortunately, existing interconnection regimes face increasing problems as telecommunications markets become competitive, and as the Internet continues to experience explosive growth. These problems include various opportunities for regulatory arbitrage, the terminating monopoly access problem, and inefficient retail rate structures caused by inefficient interconnection prices. These growing problems call into question the continued viability of the existing system and highlight the need to develop a rational and uniform system of interconnection pricing that is technologically neutral and that will allow the lifting of regulation as competition develops.

134. This paper proposes a unified approach to interconnection pricing, which would apply to all types of carriers that interconnect with, and to all types of traffic that pass over, the local circuit-switched network. The proposed approach should eliminate or significantly ameliorate the most significant of the problems afflicting current interconnection regimes. It should also encourage efficient use of networks by customers and efficient investment and deployment by carriers. Finally, it should reduce the need for regulatory intervention, both now, and as competition develops in all telecommunications markets.

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