ORIGINAL

Before the

STATE OF FLORIDA
PUBLIC SERVICE COMMISSION

In the Matter of Global NAPs, Inc. Petition for Arbitration Pursuant to 47 U.S.C. Section 252(b) of Interconnection Rates, Terms and Conditions with ALLTEL Florida, Inc.

Docket No. 011354-TP

Direct Testimony

of

LEE L. SELWYN

on behalf of

Global NAPs, Inc.

September 27, 2002

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INTRODUCTION

Qualifications

Q. Please state your name, position and business address.

A. My name is Lee L. Selwyn. I am President of Economics and Technology, Inc., ("ETI"), Two Center Plaza, Suite 400, Boston, Massachusetts 02108. Economics and Technology, Inc. is a research and consulting firm specializing in telecommunications economics, regulation, management and public policy.

Q. Please summarize your educational background and previous experience in the field of telecommunications regulation and policy.

A. I have prepared a Statement of Qualifications, which is attached hereto as Attachment 1.

Q. Have you previously testified before the Florida Public Service Commission ("Commission")?

A. Yes. I have testified before this Commission on a number of occasions dating back to the mid-1970s, on the subjects of rate design and service cost analysis on behalf of business telecommunications users as well as the State of Florida Department of General Services. These cases have included Dockets 74805-TP, 760842-TP, 810035-TP and 820294-TP involving Southern Bell, Docket 74792-TP involving General Telephone

Company of Florida, Docket 750320-TP involving Central Telephone Company of Florida. I also testified in Docket 950696-TP on the subject of Universal Service, on behalf of Time Warner AxS and Digital Media Partners. In 1997, I offered testimony in Docket No. 960833-TP/960847-TP on behalf of AT&T Communications of the Southern States, Inc. ("AT&T"), MCI Telecomm and MCI METRO Access. I also have testified before this Commission on certain reciprocal compensation issues on two prior occasions. In November 1999, I testified on behalf of Global NAPs, Inc. ("GlobalNAPs") in a complaint proceeding, Docket 991267-TP. In May 2000, I provided testimony on behalf of Global NAPs in Docket 991220-TP, concerning certain reciprocal compensation issues relating to Global NAPs' interconnection agreement with BellSouth Telecommunications, Inc. ("BellSouth"). I have also presented three rounds of prefiled testimony in the Commission's ongoing generic proceeding on reciprocal compensation, Docket 000075-TP, on behalf of several ALECs intervenors.[1]

Assignment

Q. On whose behalf is this testimony being offered?

A. This testimony is offered on behalf of Global NAPs, Inc.

Q. What is your assignment in this proceeding?

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1. These intervenors included AT&T Communications of the Southern States, Inc., TCG of South Florida, Global NAPS, Inc., MediaOne Florida Telecommunications, Inc., Time Warner Telecom of Florida, LP, Allegiance Telecom of Florida, Inc., Florida Cable Telecommunications Association, Inc., and the Florida Competitive Carriers Association.

A. ETI has been engaged by Global NAPs to provide expert testimony addressing several of the outstanding contested issues between Global NAPs and ALLTEL Florida, Inc. (referred to as "ALLTEL") that have been designated for arbitration.

Q. What specific issues are addressed by your testimony?

A. My testimony addresses the following specific issues:

- Whether ALLTEL should be granted a rural exemption from having to interconnect with Alternative Local Exchange Carriers ("ALECs").

- Whether any carrier should be required to install more than one point of interconnection per LATA;

- Whether each carrier should be responsible for the costs associated with transporting traffic to a single point of interconnection;

- Whether Global NAPs should be required to adopt the local calling area boundaries currently defined by ALLTEL;

- Whether Global NAPs should be able to assign NXX codes to its customers that are "homed" to a central office switch outside of the customer's local calling area (sometimes referred to as "virtual" NXX assignments) in order to compete directly with Foreign Exchange ("FX") service that has long been offered by ALLTEL; and

- The appropriate form of intercarrier compensation for locally-rated traffic exchanged between Global NAPs and ALLTEL, including calls terminated to Internet Service Providers (ISPs).

Summary of Testimony

Q. Please briefly summarize your testimony on these issues.

A. Although ALLTEL has requested to be granted a rural exemption pursuant to Section 251 (f) of the Act, it has not supported its request with sufficient analyses that lead to a conclusion that interconnecting with Global NAPs would be economically burdensome. While anticompetitive conduct by an ILEC is problematic in any geographic service area, it can be particularly destructive in rural areas, where competitive entry tends to occur more slowly and new entrants' potential profit margins are thinner. In this context, the Commission should not accept ALLTEL's claim that a given interconnection arrangement would be "unduly economically burdensome" unless ALLTEL has sufficiently quantified and demonstrated that such interconnection obligations would prove to be burdensome under the standards articulated Section 251 (f) of the Act.

The issues being arbitrated by the Commission raise fundamental concerns about the physical interconnection arrangements (number and location of points of interconnection) between ILECs and ALECs, and the use by ALECs of so-called "virtual" NXXs to provide Foreign Exchange ("FX") service to their customers. Indeed, these issues go to the heart of the need to establish regulatory policies that are designed to flexibly

promote and encourage competition — the vision of the 1996 federal *Telecommunications Act* — as opposed to policies whose purpose is to protect the monopoly position of the incumbent — the vision of the ILECs.

To understand the critical nature of these issues, it is important to recognize first that ALECs face a considerable challenge in devising a strategy to compete with the ILEC's long-established serving arrangements, massive customer base, and ubiquitous network. At the same time, telecommunications technology has changed significantly since the ILEC's basic network design and construction was established. Moreover, ALECs will typically not begin with a mix of customers that is in any way similar to the ILEC's customer base, either in terms of service needs or customer location; to the contrary, most ALECs will likely find that they can most easily gain a foothold in the market by serving one or more niches out of the total market demand for telecommunications services. The ALEC, therefore, will face different economic and market constraints on its network design than those faced by the ILEC. It is inevitable that these different considerations will lead ALECs to deploy networks that look very different from the ILEC's network — in terms of the number and locations of switches and inter-switch facilities, the length and nature of customer loops, and the types of services predominantly provided to their customers.

The Commission should encourage and accommodate these different ALEC strategies and network topologies. It would be regulatory folly to think that any ALEC will, should, or even could merely mimic or "clone" the ILEC's embedded network any time in the foreseeable future, if ever. Indeed, if the ILEC was building its network on a

clean slate, it would probably not clone *itself*; instead, it would take advantage of new technology to build a different network than it has today. For this reason, it is critically important to the development of competition that regulators *not* make the mistake of assuming that the ILEC's network architecture is somehow written in stone, or even optimal to the needs of telecommunications consumers today. To the contrary, regulators should be alert to and resist ILEC efforts to impose costs on their competitors by using regulatory policies designed for other purposes to force ALECs to build facilities, or assume costs, that are not germane to the ALECs' own competitive strategies.

These considerations lead to the following general conclusions, which are explained at greater length in the body of this testimony:

- As the Commission has recently concluded in its Reciprocal Compensation Order, the party originating traffic is responsible for getting that traffic from wherever it originates on its network to the other party's point of interconnection. The notion that ALECs should have to "pick up" traffic from the ILEC at some point close to the location where the traffic originates on the ILEC's network is simply an anti-competitive effort to shift to ALECs costs that the ILEC should properly bear.

- ILECs have no right to demand interconnection at any particular point on an ALEC's network (although they do have an obligation to interconnect). ALECs, however, have the express right to establish interconnection "at any technically feasible point" on the ILEC's network. These obligations are asymmetrical *on purpose*. This asymmetry is designed to offset, in part, the inherent advantages of

the ILEC's ubiquitous network and widely dispersed customer base. For this reason, ALECs are permitted to establish networks where and how they can, to deliver ALEC-bound traffic to the ALEC. ALECs also have, and ILECs are required to provide, maximum flexibility to ALECs for delivery of ILEC-bound traffic anywhere that is technically feasible (for the ILEC) and convenient (for the ALEC).

- Modern telecommunications technology has made the distance between a calling and called party almost totally irrelevant to the cost of handling a call. Basing charges on the distance a call is carried is a legacy of the era of legally sanctioned telephone monopolies, but it has no legitimate role to play in competitive inter-carrier relationships. ALLTEL would incur *de minimis* additional costs to transport Global NAPs-destined calls beyond their local calling area boundaries. Therefore, the ILECs should not be permitted to subject Global NAPs to payments for such transport that would be orders of magnitude higher than those costs.

- In part because distance has become irrelevant as a cost driver, the "location" to which particular NXX codes are "assigned" should not matter for any significant inter-carrier purpose. The patchwork quilt of "rate centers" and "local calling areas" that the ILECs created over the last hundred years bears no relationship to the technological or competitive realities of today. As a result, regulators should place no restrictions on which telephone numbers carriers can assign to their customers; to the contrary, regulators should establish a regime in which carriers are permitted

maximum competitive flexibility with respect to the creation and marketing of both "inward" and "outward" local calling areas.

- ALLTEL should not be allowed to prohibit Global NAPs from offering FX services to its customers using "virtual" NXX arrangements, given that their costs are not affected by that practice and the ILECs themselves offers FX services that involve the assignment of "virtual" telephone numbers to customers, *i.e.*, numbers rated to exchanges different from the one in which the customer is physically located and where the service is physically terminated.

The final section of my testimony addresses the issue of intercarrier compensation for locally-rated traffic exchanged between Global NAPs and ALLTEL. I review the history of the FCC's efforts to impose a distinction for intercarrier compensation purposes between ISP-bound calls and other locally-rated traffic, and describe the rules set forth in the FCC's *ISP Remand Order* which presumably govern intercarrier compensation in this instance. I recommend that, in the event that the Commission determines that the specific intercarrier compensation rules set forth in the FCC's *ISP Remand Order* do not apply to locally-rated traffic exchanged between Global NAPs and ALLTEL (*e.g.*, as a result of an appellate court ruling to reverse, vacate, or stay the *ISP Remand Order*), the Commission should apply a symmetric, TELRIC-based reciprocal compensation rate to all such traffic, including ISP-bound calls.

ALLTEL'S "RURAL EXEMPTION" CLAIM

The Commission should apply a stringent standard to ILECs such as ALLTEL that seek to avoid the interconnection obligations of Section 251 on the basis of the "rural telephone company" exemption, because anything less creates powerful incentives for ILECs to use the rural carrier designation as a means to impede local service competitive entry in their service areas.

Q. ALLTEL's Response to Global NAPs' Petition for Arbitration includes a petition pursuant to Section 251(f) (1) and (2) of the Act for "certain suspensions and/or modifications" of certain requirements which should not be applied to ALLTEL due to its status as a rural carrier.[2] Because of its rural telephone company status, ALLTEL argues that the Commission should allow it to refuse the specific terms of interconnection that Global NAPs seeks relative to Issues 1-4 because they would be "unduly economically burdensome" or "technically infeasible" for ALLTEL.[3] Dr. Selwyn, in your view, what standards should the Commission apply when evaluating ALLTEL's claims that those circumstances apply?

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2. *In the Matter of Global NAPs, Inc. Petition for Arbitration to 47 U.S.C. § 252(b) of Interconnection Rates, Terms and Conditions with ALLTEL Florida Inc.;* Florida PSC Docket No. 0111354-TP, ALLTEL's Response to Global NAPs, Inc.'s Petition for Arbitration, Including ALLTEL's Petition for Section 252 (f)(2) Suspensions and Modifications, November 5, 2001, at pgs.1 and 8 ("ALLTEL Response"). ALLTEL asserts that it is not obligated to interconnect with Global NAPs in the manner that Global NAPs proposes without reference to ALLTEL's status as a rural carrier. However, it asks that should the Commission find to the contrary, that the Commission grant ALLTEL's rural carrier petition. See ALLTEL's Response, para. 36.

3. *Id.*, at para. 36.

A. I am not an attorney and thus am not offering a legal opinion. However, as a policy matter, the Commission should apply a stringent standard to ILECs such as ALLTEL that seek to avoid the interconnection obligations of Section 251 on the basis of the "rural telephone company" exemption, because anything less creates powerful incentives for ILECs to use the rural carrier designation as a means to impede local service competitive entry in their service areas. While anticompetitive conduct by an ILEC is problematic in any geographic service area, it can be particularly destructive in rural areas, where competitive entry tends to occur more slowly and new entrants' potential profit margins are thinner. In this context, the Commission should accept a claim that a given interconnection arrangement would be "unduly economically burdensome" only when the ILEC provides:

(1) A quantified estimate, supported by verifiable input data and calculations, of the incremental economic impact of the disputed interconnection arrangement, relative to the next-best option; and

(2) A demonstration that this incremental economic impact is "unduly" burdensome, *i.e.*, that it would significantly increase the Company's overall costs of service and have a substantial adverse impact on the Company's annual earnings levels.

Similarly, when an ILEC such as ALLTEL contends that a particular interconnection arrangement is "technically infeasible," the Commission should accept that claim only when it is supported by a detailed and convincing explanation of the technical reasons why that arrangement cannot be implemented.

Q. Has ALLTEL demonstrated that Global NAPs' interconnection proposals warrant an exemption under these standards?

A. No, certainly not. ALLTEL does not supply any verifiable data to support a finding by this Commission that Global NAPs' proposed resolutions of Issues 1-4 would be either "unduly economically burdensome" or "technically infeasible" for ALLTEL to implement.

Q. ALLTEL asserts that, as a rural carrier, it is only required to exchange traffic with Global NAPs at interconnection points *within ALLTEL's network*. Do you agree?

A. It is my understanding that Global NAPs intends to establish an interconnection point within ALLTEL's network, so ALLTEL's argument is moot. However, relative to Issues 1 and 2, ALLTEL asserts that Global NAPs "has misinterpreted and misapplied certain FCC implementing orders and a prior decision of this Commission regarding the obligation and circumstances, if any, under which a rural ILEC, such as ALLTEL, may be required to establish one or more points of interconnection ("Interconnection Points") within said rural ILEC's existing network architecture."[4] ALLTEL does not specifically reference which FCC orders it believes Global NAPs has misinterpreted or applied. Moreover, ALLTEL provides no quantification of the costs of a single point of inter-connection per LATA relative to the multiple points of interconnection arrangement that ALLTEL seeks to impose on Global NAPs.

4. ALLTEL's Response, at para. 11.

ALLTEL has also failed to provide *any* evidence concerning the magnitude of the alleged "economic burden" that a single point of interconnection would impose on ALLTEL, so that there is no basis for the Commission to conclude that it would be an undue burden. Moreover, ALLTEL offers no explanation as to why a single point of interconnection would be "technically infeasible."

In similar fashion, no credible support is offered for ALLTEL's claim that Global NAPs' proposals relative to contested Issues 3 and 4 warrant an exemption. With respect to Issue 3, ALLTEL claims that there is no "basis in law for GNAPS or the Commission to require that a rural ILEC, such as ALLTEL, assume the undue economic burden of extending its network beyond its current boundaries."[5] I am not aware of any requirement in the proposed agreement that would require ALLTEL to extend its network beyond its current boundaries. Again, ALLTEL has failed to provide evidence of or quantification of such "economic burden." The Commission should give no weight to this claim and not allow ALLTEL to use it to escape its interconnection obligations under Section 251.

ALLTEL makes no specific reference to its rural carrier status with respect to Issue 4 beyond its general claim that Global NAPs' interconnection requests with respect to Issues 1, 2, 3 and 4 are "unduly economically burdensome" and "not technically feasible."[6]

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5. *Id.*, at para. 18.

6. *Id.*, at para. 36.

While not offering a legal opinion, it is my understanding that ALLTEL has the burden of proof to show this Commission why its request for exemption as a rural carrier should be granted. ALLTEL's Response does not contain such evidence. If ALLTEL's witnesses do attempt to make such a showing in their testimony, Global NAPs will respond in rebuttal testimony. However, at this time, ALLTEL has not provided such evidence.

POINT OF INTERCONNECTION AND VIRTUAL FX ISSUES

ILECs such as ALLTEL continue to reflect their long history as franchise monopoly service providers in the massive scale and ubiquity of their local exchange networks, whereas ALECs tend to design their networks to more closely accommodate current and anticipated demand in an evolutionary, flexible manner.

Q. Are there major differences between the architectural features of ILEC and ALEC networks?

A. Yes. Local telephone networks are comprised of three principal components:

- *Subscriber loops* — dedicated facilities interconnecting the local exchange carrier wire center with the subscriber's premises and/or equipment;

- *End office switches* — the switching systems at which individual subscriber loops terminate and which interconnect subscribers with each other and with interoffice and interexchange network facilities; and

- *Interoffice network* — trunking and switching facilities that provide interconnections among end offices and between end offices and other telecommunications carriers.

The principal architectural differences between ILEC and ALEC networks arise largely in the relative *mix* of these various network components.

Q. Please explain.

A. ILEC networks have been built up over more than a century and generally consist of a large number of end offices that are physically located in relatively close geographic proximity to the subscribers they directly serve. For example, ALLTEL currently operates a total of 10 remote switches and a number of central office switches in its Florida service areas that terminate the approximately 92,182 access lines (subscriber loops) served by the Company.[7] When a call involves customers served by different end offices (for example, customers located in different communities), completion of the call requires that it be routed between the two end offices over an interoffice trunk. In order to avoid deploying dedicated interoffice trunks between every possible pair of ILEC end offices, in most cases individual end offices are connected (via interoffice trunks) to an intermediate switching point known as a "tandem" office. The tandem switch (sometimes referred to as a "Class 4" switch in the traditional North American network hierarchy) can then interconnect any of the individual end offices to which it is directly trunked. Where the end offices involved in a particular call are trunked to (subtend) *different* tandem switches, the call is completed via an interoffice trunk between the two tandems. In certain situations in which particularly high volumes of traffic exist within pairs of end offices, direct interoffice trunks may be used to connect the two end office switches involved.

7. See, Local Exchange Routing Guide (LERG), January 2002 for the number or remote switches. See, Florida Public Service Commission "*Consumer Activity Report*", February 2002, at 19 for the number of access lines.

Q. Why might an ALEC network not be designed the same way?

A. The differences between ILEC and ALEC network architectures are best explained in terms of the relative economics of switching vs. transport.

Q. Are switching and transport economic substitutes for one another?

A. In some cases, yes. One way of looking at the principal network components identified above is in terms of the primary functions of switching and transport. Subscriber loops support a transport function, carrying traffic between the customer's premises and the serving wire center; interoffice trunks also provide a transport function, carrying traffic from one switch to another. By introducing a tandem switch to interconnect a number of individual end offices, one avoids the need to deploy direct interoffice trunks between every possible pair of end offices on the ILEC's network. This is an example of a case where switching and transport are economic substitutes for one another. Similarly, by deploying end office switching facilities in close geographic proximity to the individual subscriber, it is possible to concentrate traffic on a smaller complement of transport facilities than would be possible if, for example, individual switches are used to serve subscribers located across a large geographic area.

The specific mix of switching vs. transport facilities in a network thus depends heavily upon the relative cost of each and the overall scale of operations of the network. ILECs such as ALLTEL serve hundreds of thousands of individual subscribers statewide and can thus afford to deploy relatively efficient, large-scale switching systems in close

geographic proximity to their customers. ALECs typically serve a customer population that is a minute fraction of the size of the ILEC's customer base. In order to achieve switching efficiencies, ALECs often deploy a relatively small number of switches, so their customers' traffic must be transported over relatively large distances.

This switching vs. transport trade-off has always been present in telecom network design: you can generally reduce switching costs by concentrating demand in a small number of large switches, but by so doing you increase the transport capacity that is required to connect the switches to customers over greater distances. In recent years, however, the scales have been tipped — *shoved* would probably be a better word — decidedly in the direction of substituting transport for switching.

As a general matter, the costs of transport have been dropping at an enormous rate in recent years. This point is highlighted in an article appearing in the January 2001 issue of *Scientific American,* "The Triumph of the Light" by Gary Stix. I have reproduced this article as Attachment 2 to my testimony. The article reports that "the number of bits a second (a measure of fiber performance) doubles every nine months for every dollar spent on the technology." In other words, the cost per unit of transport is cut by 50% *every nine months*. Put another way, over the past five years, the cost per unit of tele-communications transport has fallen by more than 98%! Transport costs have become far less distance-sensitive and, with the use of high-capacity fiber optics, massive amounts of capacity can be deployed at little more than the cost of more conventional transport capacity sizes.

One effect of this economic trend has been that ILECs have been consolidating multiple switches into large main frame/remote configurations. In the case of ALECs, the substantially smaller scale of their customer base and traffic load makes any other approach infeasible as an economic matter.

Q. How might a typical ALEC network be designed?

A. Some ALECs will use Unbundled Network Element (UNE) loops leased from ILECs, along with ALEC-owned subscriber loop facilities, and collect these loops at centralized locations in each community in which the ALEC offers service. At these collection points, the traffic is concentrated onto high-capacity transport facilities (that may be leased from the ILEC or from other carriers or owned by the ALEC itself) for the some-times long trip to the ALEC switch. There are several different types of concentration arrangements that may be used, depending upon the aggregate amount of traffic that is involved. For relatively low-volume situations, passive multiplexing of the individual subscriber loops onto specific dedicated channels in the high-capacity "pipe" may be most efficient; in other cases, small stand-alone switches or Remote Service Units (RSUs) subtending the distant Host Switch may be deployed. Where the ALEC's customers are concentrated within a small, relatively confined area (*e.g.*, within a shopping mall), a small PBX-like switch may be used to interconnect individual end users with a common pool of facilities for the trip to the ALEC central office switch.

Other ALECs adopt different strategies, depending on the type of customers they serve and the needs of those customers. For example, while some businesses (*e.g.*, a dry

cleaners or a movie theater) have a specific geographic location that is significant to their business operations, others (*e.g.*, taxicab dispatch services, ticket agencies, answering services, unified message service providers, Internet service providers) do not. Customers of this latter sort — particularly in times of expansion — may be willing to locate some or all of their telecommunications-related gear at or near the ALEC's location, if such an arrangement offers other benefits. To accommodate such customers requires the ALEC to obtain more space in its own central offices than it needs for its own operations, in order to accommodate customers' collocated equipment. This arrangement amounts to an economic trade-off of the costs of real estate and office space (which the ALEC recovers through charges to its customers for (short) loops and for collocation space) for the costs of loop plant to a distant customer location (which the ALEC would recover purely through loop charges). An ALEC pursuing this strategy would have switching resources and collocation space, as well as interconnection facilities between the ALEC and the ILEC. Such an ALEC will have few if any "loops" — at least if a "loop" is construed to require outside plant.

Other ALEC strategies, involving still other mixes of telecommunications network investments and other investments, are also possible. The point of the 1996 Act is to create an environment where the arrangements a particular carrier deploys are driven by economics, ingenuity and customer demand, as opposed to obsolete regulatory categories and assumptions. In particular, ALECs should not be forced to replicate or emulate legacy ILEC network multi-switch architectures by, for example, being forced to construct (or otherwise acquire the use of) dedicated facilities between the ALEC's switch and multiple ILEC switches.

Q. Would adoption of ALLTEL's position concerning the location of POIs and responsibility for transport have such an undesirable effect?

A. Yes, that is my understanding. While I have not been directly involved in the negotiations between ALLTEL and Global NAPs, I have reviewed GNAP's Petition for arbitration[8] discussed the company's position with Global NAPs' counsel for those negotiations; and reviewed ALLTEL's response to the Global NAPs Petition.[9]

Q. Please outline ALLTEL's position as you understand it.

A. It appears that ALLTEL's position is that Global NAPs should be required to establish multiple POIs in a LATA in order to receive traffic from ALLTEL, and that those POIs should be "within each of ALLTEL's local exchange areas."[10] ALLTEL also appears to believe that Global NAPs may desire to establish a POI for the exchange of traffic with ALLTEL that would be located a significant distance away from ALLTEL's network.[11]

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8. *In the Matter of Global NAPs, Inc. Petition for Arbitration to 47 U.S.C. § 252(b) of Interconnection Rates, Terms and Conditions with ALLTEL Florida Inc.; ALLTEL Florida Communications Corp.*, Florida PSC Docket No. 011354-TP Petition for Arbitration, October 10, 2001 ("Global NAPs Petition").

9. *In the Matter of Global NAPs, Inc. Petition for Arbitration to 47 U.S.C. § 252(b) of Interconnection Rates, Terms and Conditions with ALLTEL Florida Inc.;* Florida PSC Docket No. 0111354-TP, ALLTEL's Response to Global NAPs, Inc.'s Petition for Arbitration, Including ALLTEL's Petition for Section 252 (f)(2) Suspensions and Modifications, November 5, 2001 ("ALLTEL Response").

10. Global NAPs Petition, at Issue 1 and para. 21.

11. ALLTEL's Response states the following at page 4: "Restates Issue 1 and the (continued...)

Counsel has advised me that contrary to this notion, it is Global NAPs' intention to establish a POI *within ALLTEL's network* in each LATA in which Global NAPs will provide services. The issues of dispute remains that while Global NAPs would establish a single POI for interconnection with ALLTEL *within ALLTEL's network*, ALLTEL is requesting that Global NAPs establish multiple POIs within its network. Moreover, I understand that ALLTEL is taking the position that each carrier is responsible for transporting its traffic to the boundary of each local exchange area defined by ALLTEL.[12]

Under the conditions being demanded by ALLTEL, Global NAPs would be compelled either to place multiple POIs in each LATA or to incur transport costs as if it had — thereby limiting the ability of Global NAPs to take advantage of a network design based upon a single switch per LATA. Such a requirement would be in contravention of the Commission's September 10, 2001 Order relative to the selection of a single point of interconnection within a LATA.[13] In that ruling, the Commission found that "ALECs have the exclusive right to unilaterally designate single POIs for the mutual exchange of

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11. (...continued)
Parties' positions as follows: Issue 1: Should ALLTEL be required to establish a POI outside of its network? Global NAPs Position: Yes. Global NAPs is not required to install more than one POI per LATA and may establish a single POI per LATA to which ALLTEL must bring Global NAPs-bound traffic even if the POI is outside ALLTEL's network."

12. Global NAPs Petition, at para. 21.

13. *Investigation into the appropriate methods to compensate carriers for exchange of traffic subject to Section 251 of the Telecommunications Act of 1996*, Florida Public Service Commission Docket No. 000075-TP, Order No. PSC-02-1248-FOF-TP, Issued September 10, 2002, at pg. 25 (*"Reciprocal Compensation Order"*).

telecommunications traffic at any technically feasible location on the incumbent's network within a LATA."[14]

The differences between ILEC and ALEC network architectures, as well as the substantially smaller scale of ALEC operations, are key sources of cost differences between the two types of carriers.

Q. Is it reasonable to expect that an ALEC's costs will differ, with respect to both level and structure, from the cost conditions confronting an ILEC?

A. Indeed, yes. There are in fact two principal sources of cost variation as between an ALEC and an ILEC with respect to the provision of local exchange service and, in particular, the costs of transporting and terminating local calls: *scale* and *facilities mix*. I address each in turn.

Scale. The overall cost of constructing and operating a telecommunications network is heavily affected by the overall volume of traffic and number of individual subscribers that the network is designed to serve; that is, telecom networks are characterized by substantial *economies of scale and scope*. As I have previously noted, ALECs serve a far smaller customer population and carry far less traffic than do ILECs. Because they are necessarily forced to operate at a far smaller scale, ALEC networks may exhibit higher average costs than ILEC networks.

14. *Id.*

Facilities Mix. All else being equal, an ALEC's network will typically consist of relatively less switching and relatively more transport or transport substitutes than would an ILEC network. While switching costs are sensitive both to the number of call set-ups as well as to aggregate call duration, transport costs tend to vary primarily with duration. Accordingly, it is reasonable to expect that ALEC local usage costs will exhibit proportionately greater duration-sensitivity and proportionately less set-up sensitivity than do ILEC usage costs.

Q. Is a LEC's choice of network architectures influenced by the level of traffic volumes that it serves or anticipates serving?

A. Yes, of course. The network design choices of the ALECs are particularly sensitive to anticipated demand conditions. To understand this, we must first consider the factors that drove the development of the ILEC networks. The design of the ILECs' contemporary networks generally reflects their traditional role as monopoly service providers serving all potential telephone service subscribers within their assigned operating areas. Under those conditions, the efficient network design tended to require an essentially ubiquitous deployment of distribution facilities, including distribution cables placed down virtually every street and extending to every business office park, high-rise building, and the like — whereupon traffic from those facilities was aggregated into higher-capacity feeder cables and transported back to a relatively high number of local, end-office switches and (other than intra-switch calls) was switched onto the interoffice transmission network for the transport of each call to its intended destination. Because ILECs serve close to 100% of the local service market, there is in each community

sufficient demand to support at least one, and often several, central office switches or "remote service units" ("RSUs"). Consequently, the geographic areas served by individual central office switches (or wire centers, in cases where switches for several "exchanges" have been consolidated) tend to be relatively small and the lengths of subscriber loops connecting the wire center with the customer's premises tend to be relatively short.

In contrast, a typical ALEC serves only a small fraction of the total customer base in any single community. Because the demand is so much smaller than for ILEC services, it would be extremely inefficient and costly for an ALEC to deploy a switch or even an RSU in each local community it wishes to serve. Instead, an ALEC will typically use one switch to serve all of its customers for a broad geographic area. An ALEC will design its network to accommodate the actual locations of its customers (including customers for whom location is variable, and might collocate with the ALEC) and their actual demand characteristics under an architecture that can be expanded in a flexible manner as demand for the ALEC's services grows.

Q. How do these different ALEC network architectures affect the issues in this proceeding?

A. Because ALECs will use very different network architectures to meet the needs of their customers than that used by the ILEC, regulators must avoid the tendency to assume that there is something automatic, appropriate, or "natural" about the ILEC's network design, or that there is anything automatic, appropriate, or "natural" about requiring ALECs to conform their operations to that design, whether for purposes of interconnection points

or otherwise. There is nothing automatically natural or appropriate about the ILEC's network design. It is essentially an accident of history in any given case. Indeed, as will be seen, the very different ALEC network architectures highlight the arbitrary (and obsolete) nature of ILEC "local calling" areas, whether for incoming or outgoing calls. In other words, the interconnection issues to be arbitrated by the Commission in this proceeding are directly affected by the fact that ALECs can, should, and do use very different network architectures than that used by the ILEC.

An ALEC is not required to establish more than one Point of Interconnection in any LATA in order to obtain LATA-wide coverage via that interconnection arrangement; and is not financially responsible for transport costs outside of the ILEC's local calling area.

Q. Dr. Selwyn, are you aware of whether this Commission has made a determination regarding the right of an ALEC to interconnect with an ILEC's network at a single point in a LATA?

A. Yes. In its *Reciprocal Compensation Order,* the Commission supports the FCC's interpretation of the *Telecommunications Act of 1996, ruling* that "ALECs have the exclusive right to unilaterally designate single POIs ... within a LATA."[15]

Q. Setting aside ALLTEL's position, are ILECs bound by any specific statutory or regulatory obligations relative to the issue of establishing Points of Interconnection (POIs) for the exchange of traffic with a ALEC's network?

15. *Reciprocal Compensation Order*, at 25.

A. Yes, I believe that they are. While I am not an attorney and am not offering a legal opinion, from a policy standpoint it is clear to me that the FCC's implementation of the interconnection requirements of the *Telecommunications Act* defines the basic framework within which the Commission should consider the question of points of interconnection and the costs of delivering traffic to them. The issue of the originating local carrier's responsibility has to be analyzed in the context of the obligations borne by two interconnected local carriers, which largely has been spelled out in the *Telecommunications Act* and the FCC's implementation of its local interconnection provisions.

As a threshold matter, it is important to understand that the interconnection requirements adopted in the *Telecommunications Act* and developed in the FCC's *Interconnection Order* do not require or provide for symmetric treatment of ILECs and ALECs. Section 251(c)(2) *obligates* ILECs to interconnect with ALECs *at any technically feasible point on the ILEC's network* "(A) for the transmission and routing of telephone exchange service and exchange access; (B) at any technically feasible point within the carrier's network; (C) that is at least equal in quality to that provided by the local exchange carrier to itself or to any subsidiary, affiliate, or any other party to which the carrier provides interconnection; and (D) on rates, terms, and conditions that are just, reasonable, and nondiscriminatory..."; by contrast, Section 251(a)(1) confers upon all telecommunications carriers the duty "to interconnect directly or indirectly with the facilities and equipment of other telecommunications carriers" but contains none of the specifics that Section 251(c) applies to *incumbent* LECs.

My understanding was recently reinforced by the FCC's ruling in a Virginia arbitration. In this ruling, the FCC explicitly mandated the single point of interconnection. More importantly, it rejected the concept that an ILEC may establish multiple interconnection points for the ostensible purpose of shifting financial responsibility of originating traffic to an ALEC.[16]

Q. Why is the lack of symmetry between ILECs and ALECs with respect to their inter-connection obligations important?

A. The key point of this asymmetry is that both the *Telecommunications Act* as well as FCC Rules hold that, in order to interconnect with an ILEC, an ALEC need establish only one (1) point of interconnection ("POI") with an ILEC at any technically feasible point *anywhere* in each LATA that the ALEC designates. The *Telecommunications Act* and FCC Rules thus *obligate* each ILEC to allow such interconnection by an ALEC at *any* technically feasible point that is designated by the ALEC.[17] Moreover, FCC regulations

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16. *Memorandum Opinion and Order, Petition of WorldCom , Inc. Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration,* CC Docket No. 00-218*; In the Matter of Petition of Cox Virginia Telcom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon-Virginia, Inc. and for Arbitration, CC* Docket No. 00-249*; In the Matter of Petition of AT&T Communications of Virginia Inc., Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc.,* CC Docket No. 002-51, Rel. July 17, 2002 (*"FCC Virginia Arbitration Decision"), para. 52.*

17. Rule 51.305(a)(2).

do not grant the ILEC the right to designate the point at which the other party must "pick up" the ILEC's traffic. In its *Local Competition Order*, the FCC explained:

> The interconnection obligation of section 251(c)(2), discussed in this section, allows *competing carriers to choose* the most efficient points at which to exchange traffic with incumbent LECs, thereby lowering *the competing carriers'* costs of, among other things, transport and termination of traffic.[18]

The FCC identified the *Act* as the source of these differing obligations.[19]

Q. Is there any prohibition against ILECs determining technically feasible interconnection points and imposing those determinations upon interconnecting ALECs?

A. I am not aware of any provision of the *Act* that says, in so many words, "ILECs may not designate the locations at which ALECs must interconnect." But that is the only rational way to understand what the statute says and what the FCC says about it. As I have previously observed, this Commission has expressly determined that "ALECs have the exclusive right to unilaterally designate single POIs."[20] As noted above, the interconnection obligations of LECs and ILECs are specifically identified in the *Act*, and ILECs'

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18. *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, 11 FCC Rcd 15499, 15588, rel. August 8, 1996 (emphasis supplied) (*Local Competition Order*), aff'd in part and vacated in part sub nom., *Competitive Telecommunications Ass'n v. FCC*, 117 F.3d 1068 (8th Cir. 1997) 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.*, 119 S. Ct. 721 (1999).

19. *Id.*, at para. 220.

20. *Reciprocal Compensation Order*, at 25.

obligations are different and more extensive than those of ALECs. An ILEC may not assume some authority that is not provided for in the *Act*.

Q. Can you cite any specific actions taken by the FCC that support your interpretation of the *Act* with respect to this issue?

A. Yes. First, the FCC promulgated Rule 51.223(a), which specifically forbids states from imposing upon ALECs the obligations that Section 251(c) imposes upon ILECs. Section 251(c)(2) requires ILECs to allow interconnection at any technically feasible point on their networks. Rule 51.223(a) indicates that ILECs have no similar right to dictate where they will interconnect with ALECs' networks. In fact, the FCC reiterated its reasoning in connection with an interconnection dispute in Oregon, where the FCC intervened and urged the court to reject US West's argument that the *Act* requires competing carriers to interconnect in the same local exchange in which it provides local service. The FCC explained:

> Nothing in the 1996 Act or binding FCC regulations require a new entrant to interconnect at multiple locations within a single LATA. Indeed, *such a requirement could be so costly to new entrants that it would thwart the Act's fundamental goal of opening local markets to competition.*[21]

More recently, in its order on SBC's Section 271 application for Texas, the FCC made clear its view that under the *Telecommunication Act*, ALECs have the right to designate

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21. Memorandum of the FCC as Amicus Curiae at 20-21, *US West Communications Inc. v. AT&T Communications of the Pacific Northwest, Inc.*, (D. Or. 1998) (No. CV 97-1575- JE), emphasis supplied.

the most efficient point *from the ALECs perspective* at which to exchange traffic. As the FCC explained:

> New entrants may select the most efficient points at which to exchange traffic with incumbent LECs, thereby lowering the competing carriers' cost of, among other things, transport and termination.[22]

The FCC was very specific:

> Section 251, and our implementing rules, require an incumbent LEC to allow a competitive LEC to interconnect at any technically feasible point. *This means that a competitive LEC has the option to interconnect at only one technically feasible point in each LATA.*[23]

Furthermore, the FCC confirmed this understanding in the *Intercarrier Compensation NPRM* it issued in April 2001.[24] At paragraph 72 of that *NPRM*, the FCC stated that "under our current rules, interconnecting ALECs are obligated to provide one POI per LATA."[25]

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22. Memorandum Report and Order, *Application of SBC Communications Inc., Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance, Pursuant to Section 271 of the Telecommunications Act of 1996 To Provide In-Region InterLATA Services in Texas*, CC Docket No. 00-65 at para. 78 (June 30, 2000).

23. *Id.*, at para. 78.

24. *See In the Matter of Developing a Unified Intercarrier Compensation Regime, Notice of Proposed Rulemaking*, CC Docket No. 01-92, FCC 01-132 (rel. Apr. 27, 2001) ("*Intercarrier Compensation NPRM*").

25. *Id.*, at para. 72, citation omitted.

All of this supports the conclusion that ALECs are *entitled* to designate one and only one location at any technically feasible point within a LATA as their POI for that LATA, and the ILEC is *required* to transport traffic to be interchanged with the ALEC between the ILEC's end office switches and that POI, with the ALEC assuming the obligation to transport the traffic between the POI and the ALEC's end office switches. Nowhere is there any provision, either in the statute or in FCC rules, that would permit an ILEC to force interconnecting ALECs to establish a POI within each ILEC local calling area or to limit the ILEC's obligations with respect to reciprocal compensation to only those situations in which the POI is physically located within the ILEC local calling area associated with the ILEC customer who originated the call or to whom the call is to be terminated. Furthermore, the respective transport obligations of the ILEC and the ALEC on either side of their POI must encompass *financial* responsibility for the associated costs of their transport as well as the physical transport activity itself.

This conclusion is also reinforced by considering the larger context of the *Act*. As a policy matter, it is unquestionable that the overriding purpose of the *Act* is to encourage competition in the local exchange market. That purpose would be frustrated if the ILEC could directly or indirectly force ALECs to incur costs to, in effect, duplicate the ILEC's ubiquitous embedded network. This anticompetitive result, however, is exactly what would occur if ALECs were forced to pick up traffic from the ILECs in multiple locations. It would also amount to the same thing, and have equally anticompetitive consequences, if the ILEC was able to shift financial responsibility for some or all of the transport costs incurred on its side of the POI to the ALEC, which is responsible for the transport that occurs on its side of the POI.

Q. The Commission has already made a determination relative to the financial responsibility of ILEC's to transport traffic from the point at which the call originates on its network to the POI. Do you have any additional comments?

A. Yes. In its *Reciprocal Compensation Order*, the Commission found that ILECs are responsible for transporting their originating traffic to the ALEC's single POI.[26] The Commission reasoned that because the ALEC also must bear the cost of transporting its originating traffic to the POI, the ILEC was not being placed at a disadvantage, and that requiring a terminating carrier to be held responsible for a portion of the transport costs of the originating carrier would "provide for asymmetrical recovery and, in addition, would appear to be contrary to 47 C.F.R. 51.703(b), which prohibits a LEC from assessing charges on any other carrier for traffic originating on the LEC's network."[27] The Commission concluded that

> Based on the foregoing, we find that an originating carrier is precluded by FCC rules from charging a terminating carrier for the cost of transport, or for the facilities used to transport the originating carrier's traffic, from its source to the point(s) of interconnection in the LATA. These rules require the originating carrier to compensate the terminating carrier for transport and termination of traffic through intercarrier compensation.[28]

Recent actions by the FCC and other state regulatory commissions also support this Commission's findings.

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26. *Reciprocal Compensation Order*, at 25.

27. *Id.*, at 23-24.

28. *Id.*, at 24.

Q. Has the FCC had the occasion to apply this understanding of its "current rules" in addressing an ILEC's contention that an ALEC is responsible for the costs of transport on the ILEC's side of the single point of interconnection where such transport extends beyond the local calling area of the ILEC's customer?

A. Yes, indeed it has. On July 17, 2002, the FCC's Wireline Competition Bureau ("Bureau") released a *Memorandum Opinion and Order* that resolved certain disputed issues brought to the FCC for arbitration by AT&T, Cox, and WorldCom, after those companies were unable to reach negotiated interconnection agreements with Verizon.[29] This consolidated arbitration case (CC Docket Nos. 00-218, 00-249, and 00-251) was initiated when the Virginia State Corporation Commission ("Virginia Commission") declined to arbitrate the carriers' disputes under Section 252(c) of TA96, and the three ALECs petitioned the FCC to preempt the Virginia Commission's authority under Section 252(e)(5).[30] The FCC granted the carriers' motion, and the two-prong proceeding commenced in January 2001.[31] The Wireline Competition Bureau notes in its July order that "[i]n this proceeding, the Wireline Competition Bureau, *acting through authority expressly delegated from the Commission*, stands in the stead of the Virginia State Corporation Commission."[32] Counsel advises me that this decision is

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29. *FCC Virginia Arbitration Decision*, at paras. 1-2.

30. *Id.*, at para. 6.

31. *Id.*, at para. 6. This proceeding is the first of two decisions to resolve the disputed terms of interconnection between the carriers. The second decision will address cost-related issues requiring arbitration. *Id.*, at para 5.

32. *Id.*, at para. 1, emphasis supplied.

final in the sense that it has taken effect, although it is my understanding that parties have appealed the Bureau's *Order* to the Commission for reconsideration.

In the *FCC Virginia Arbitration Decision*, the Bureau interpreted Section 251(c)(2) of the *Act*, which grants ALECs the right to request interconnection at any technically feasible point on the incumbent's network, to mean that ALECs have the right to interconnect at a single point per LATA.[33] Specifically, the Bureau declared that:

> *[u]nder the Commission's rules, competitive LECs may request interconnection at any technically feasible point. This includes the right to request a single point of interconnection in a LATA.* The Commission's rules implementing the reciprocal compensation provisions in section 252(d)(2)(A) prevent any LEC from assessing charges on another telecommunications carrier for telecommunications traffic subject to reciprocal compensation that originates on the LEC's network. Furthermore, under these rules, to the extent an incumbent LEC delivers to the point of interconnection its own originating traffic that is subject to reciprocal compensation, the incumbent LEC is required to bear financial responsibility for that traffic. The interplay of these rules has raised questions about whether they lead to the deployment of inefficient or duplicative networks. The Commission is currently examining the interplay of these rules in a pending rulemaking proceeding. As the Commission recognized in that proceeding, incumbent LECs and competitive LECs have taken opposing views regarding application of the rules governing interconnection and reciprocal compensation.[34]

Thus, this decision confirms that, under the FCC's existing rules and interpretation of the *Act*, ALECs have the option to determine a single point of interconnection per LATA.

33. *Id.*, at para. 52.

34. *Id.*, at para. 52, (footnotes omitted, emphasis supplied).

Q. Has ALLTEL attempted to shift financial responsibility for its originating transport in that manner?

A. Yes. As I explained earlier in my testimony (at page 25), my understanding is that ALLTEL's position in its negotiations with Global NAPs is that Global NAPs should bear the costs of any transport that may be required to deliver the ILECs' originated traffic to a single POI.[35] Imposition of these requirements would have the effect of shifting the ILECs' financial responsibility for originating transport to Global NAPs, contrary to the principle that this Commission and the FCC have articulated.

Q. Did the Bureau also address the issue of transport costs in the *Virginia Arbitration Decision*?

A. Yes, clearly it did. As paragraph 52 demonstrates, the Bureau also determined unequivocally that the incumbent is responsible for the costs associated with transporting a call originating on its network to the ALEC's POI. In doing so, the Bureau cited Rule 51.703(b) as prohibiting LECs "... from charging any other carrier for traffic originating on that LEC's network ..."[36] Furthermore, the Bureau rejected Verizon's proposal attempting to establish multiple interconnection points ("IPs"), separate from the ALEC's POI, to serve as points at which the ALEC would become responsible for

35. See Global NAPs Petition, at para. 21.

36. *FCC Virginia Arbitration Decision*, at paras. 52, footnote 119, and para. 53, footnote 125.

the costs associated with further transport on Verizon's network.[37] Thus, the Bureau has clearly stated in the *Virginia Arbitration Decision* that carriers are responsible for the transport of their own traffic over their networks up to the POI(s) chosen by the ALEC.

The incremental costs that ALLTEL would incur to transport calls to a single POI within a LATA would be *de minimis*.

Q. Does an ILEC such as ALLTEL typically incur transport costs for calls that it originates and terminates within the same local calling area?

A. Yes. Local calling areas generally consist of a number of individual exchanges and in some cases multiple central offices within individual exchanges. When an ILEC carries a local call on an end-to-end basis (*i.e.*, without a hand-off to another carrier), it typically must transport that call from the originating end office to the terminating end office, over interoffice facilities.[38] For example, a local call from the Raiford exchange to the Lake Butler exchange would require transport by ALLTEL of about 8 miles between the two serving end offices.[39] Exactly the same principle applies where Global NAPs is provided with a single POI for LATA-wide access, the only difference being the average *distance* over which the ALLTEL transport would occur.

37. *Id.*, at para. 53.

38. The only exception is when the call is an entirely *intraoffice* call, *e.g.*, a call placed to a neighbor down the street.

39. See Table 1 of Attachment 3 to my testimony.

Q. If ALLTEL is required to transport calls to a single POI in each LATA as the Commission has ruled in its *Reciprocal Compensation Order,* would ALLTEL incur significantly increased transport costs because of the additional distances involved?

A. No, it would not. In fact, as I shall demonstrate below, the incremental costs that ALLTEL would incur to extend transport beyond the local calling area to a single POI in each LATA are *de minimis*, in large part reflecting the drastic reductions in unit costs for transport that advances in fiber optic transmission technology have produced.

Q. Have you calculated the additional transport costs that ALLTEL would incur under the single POI arrangement that Global NAPs seeks vs. the multiple POI arrangement that ALLTEL is attempting to impose?

A. Yes. The general method that I have applied is to develop an estimate for the incremental costs of transport to a single POI in a LATA relative to the transport that would ordinarily occur within the local calling area, in this case assumed to be ALLTEL's definition of flat rate service local calling. To do this, one can first estimate the difference between the average transport distances associated with those two cases, and then multiply that incremental distance by the unit cost of the additional transport required. To perform this estimate, I have focused upon the Jacksonville LATA (904) and assumed, for illustrative purposes, that Global NAPs' single POI is located in Lake Butler (where ALLTEL has a tandem). As such, my references below to ALLTEL's flat rate calling area and exchanges specifically relate to ALLTEL Florida Communications Corp. exchanges unless otherwise noted.

ALLTEL's flat rate calling area for Lake Butler includes two other exchanges.[40] Assuming that Global NAPs establishes a single LATA-wide POI in Lake Butler, I have calculated the average ALLTEL transport distance relative to the Global NAPs' Lake Butler POI separately for (a) calls confined to the local calling area of Lake Butler, and (b) for transport to and from ALLTEL exchanges LATA-wide. The average transport distance for local calls within the Lake Butler local calling area is 11.38 miles; for transport from a single Global NAPs POI in Lake Butler to ALLTEL exchanges throughout the Jacksonville LATA, the average transport distance would be 37.98 miles. Thus, the *additional* transport distance for a single LATA-wide POI vs. ALLTEL's local calling area-specific POIs is 26.6 miles. Attachment 3 to my testimony provides the workpapers for this calculation.

Q. How did you determine the average transport distance for each of these two cases?

A. For this calculation, I assumed that the volume of traffic to/from each ALLTEL central office is proportional to the number of access lines served out of that office. Using office-by-office access line counts, I developed weights for each ALLTEL central office and multiplied those weights by the distance between that central office and the Lake Butler switch. I then summed these weighted distances to develop the weighted *average* distance.

40. The ALLTEL Florida Communications Corp. exchange for Lake Butler has flat rate service calling to the exchanges of Alachua and Raiford. *See*, ALLTEL Florida, Inc. General Customer Services Tariff, Section 3: Basic Local Exchange Service, Seventh Revised page 6, Effective August 1, 2000.

Q. Once you have determined the average additional transport distance of 26.6 miles, how can that be converted into the incremental cost of transport that would be borne by ALLTEL?

A. The incremental cost of that additional transport is simply the additional mileage, 26.6 miles, multiplied by an estimate of the unit cost of transport. For the forward looking economic unit cost of transport , I have relied upon the Georgia Public Service Commission's $2.72 per mile[41] charge for BellSouth's transport at the DS-3 level. A DS-3 transport facility has a capacity of 672 voice (DS-0) channels, and can carry approximately 8.9-million minutes of traffic per month.[42] Dividing the $2.72 per-mile cost of a DS-3 transport facility, by 8.9-million minutes, I have calculated a voice-grade transport rate per-minute per-mile of $0.000000306, *i.e.*, about three one-hundred thousandths of a cent. Multiplying this per-mile rate by the 26.6 miles of additional transport associated with a single POI vs. a POI in each of ALLTEL's local calling areas, I calculated the average additional transport cost per minute at $0.000008129, *i.e.*, about eight ten-thousandths of a cent. See Attachment 3 to my testimony for the workpapers supporting this calculation.

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41. Set by the Commission as BellSouth's interim DS-3 mileage rate on April 24, 2001, as stated in Docket No. 11853-U. This rate is listed in Docket No. 10692, Document No. 47662, 6/04/01, *Revised Statement of Generally Available Terms and Conditions for Interconnection — Unbundling and Resale*, May 31, 2001, GA SGAT-Attachment A. BellSouth's cost witness Ms. Cox has confirmed that this is a "cost-based rate." *See* Cox Direct (April 3, 2001) at 8, lines 1-6.

42. This estimate was obtained from the testimony of BellSouth's cost witness Cynthia K. Cox before this Commission in Docket No. 13542-U (Direct Testimony of Cynthia K. Cox on behalf of BellSouth, April 3, 2001, at page 11). Ms. Cox testified that a "level of 8.9 million minutes of traffic per month is typically equivalent to a DS3 level" (*id.*).

Q. In your selection of the DS-3 level as the appropriate unit of transport capacity to apply in this analysis, did you consider the fact that because ALLTEL's service territory in Florida includes some smaller towns and rural areas, not all of its interoffice transport routes face demand that is sufficiently high to utilize a DS-3 facility's entire capacity?

A. Yes, and I have concluded that the DS-3 level is appropriate to apply for this purpose notwithstanding that some ALLTEL exchanges may typically generate demand that, in aggregate, falls below the DS-3's full capacity (*i.e.*, 672 simultaneous voice calls). First, as I noted on page 15 of my testimony, ALLTEL's switching infrastructure in Florida includes 10 remote service units (RSUs) serving its central office switches in the state. RSUs are typically used to serve access lines in smaller exchanges where it is uneconomic to deploy a fully-functional standalone switch. Because an RSU connects to a host switch by a so-called "umbilical" fiber transport facility (which is typically of DS-3 capacity and may traverse dozens of miles in its own right), the effect is that the demand generated by those smaller exchanges served by RSUs is aggregated at the host switch, thereby increasing the capacity requirements for transport from the host to other points in the ILEC network. Thus, small exchanges that might otherwise require interoffice transport at a small capacity level (*e.g.*, 20-50 simultaneous voice grade calls) are instead likely to be served by an RSU and a host with considerably larger interoffice trunk connections. Second, the economics of transport are better than linear, in that the cost of a DS-3 transport link is much less than the cost of 28 DS-1 facilities (which would provide capacity equivalent to a DS-3), so that the break-even for employing a DS-3 is much lower than a requirement that all 672 potential channels of a DS-3 must be

utilized. For these reasons, a DS-3 capacity is the appropriate choice for my cost analysis.[43]

Q. Your DS-3 cost calculation is based only upon the per-mile rate element for DS-3 transport, and does not include any of the costs associated with the Fixed rate element (*i.e.*, facility terminations) or Entrance Facilities. Why is that?

A. Recall that we are attempting to identify the *additional* costs associated with transport beyond ALLTEL's local calling area, relative to the costs that the Company would incur for delivery of calls within that local calling area. Of the various rate elements applicable to DS-3 transport, only the per-mile charge would apply, since the monthly fixed charge and the charges associated with Entrance Facilities are required for a dedicated interoffice transport facility whether it is wholly confined within a single ALLTEL local calling area or runs between two different ALLTEL local calling areas. Hence, neither of those categories of charges are in any sense an "additional" transport cost for delivering calls outside of ALLTEL's local calling area.

Q. Have you compared the above captioned cost calculations using DS 3 rates in other states?

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43. In fact, ALLTEL likely utilizes even larger capacity fiber transmission systems for at least some of its interoffice transport facilities; hence, if anything, the use of DS-3 as the benchmark capacity level for the purpose of calculating transport cost likely overstates ALLTEL's actual cost.

A. Yes, I have. Applying SBC's DS-3 rate in Texas of $16.16 per-mile results in a per-minute costs for the additional 26.6 miles of transport outside of ALLTEL's Lake Butler local calling area of $0.00004829, *i.e.*, about four thousandths of a cent (see Attachment 3, Table 4 to by testimony).

Q. Did you calculate ALLTEL's transport costs using its currently effective switched access DS 3 rate?

A. Yes. Even if I calculate transport costs based on ALLTEL's exceedingly high switched access DS 3 rate of $175.00, which I would argue, fails to comply with the TELRIC methodology; the additional costs of transporting traffic outside of ALLTEL's Lake Butler local calling area is extremely small.[44] Applying ALLTEL's DS 3 rate to the additional 26.6 miles results in transports costs of $0.00052303, or about five hundredths of cent (see Attachment 3, table 3). As the above cost comparisons indicate, the additional costs ALLTEL would incur to deliver traffic to points outside the local calling area, as opposed to within the local calling area, are *de minimus*.

Q. What conclusions do you draw from these calculations?

A. The primary conclusion that I draw from these calculations is that the additional costs that ALLTEL would incur in order to deliver traffic from a Global NAPs POI in Lake Butler to points outside of the ALLTEL local calling area of Lake Butler, as opposed to

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44. See, ALLTEL Florida Inc. Access Service Tariff, Section 16.4.C.2 (3)(b), Effective October 1, 1996.

delivery within that local calling area, are extremely small, on the order of eight ten-thousandths of a cent, which I would consider to be *de minimus* relative to the transport costs already incurred by ALLTEL in its Florida network.

Q. Wouldn't Global NAPs incur the same costs if it were required to deploy its own transport network rather than having ALLTEL perform this function?

A. No, if Global NAPs were forced to undertake that transport on its own network it would incur far higher costs. While ALLTEL is not the size of a Bell operating company, nevertheless with some 92,182 access lines, it operates at a scale much larger than an ALEC such as Global NAPs, and therefore enjoys scale economies that are not available to them. The costs of fiber optic transport facilities are particularly sensitive to scale, *e.g.* the unit cost of carrying an additional voice grade circuit on an OC-3 transport system (which equates to 2016 voice grade channels) is much less than the comparable unit cost relative to an OC-1 transport system (672 channels). The scale economies that are uniquely available to ILECs as a result of their established customer bases and ubiquitous networks were one of the reasons that Sections 251 and 252 of the *Telecommunications Act* requires that the ILECs provide ALECs with access to their networks on an unbundled basis.

ALLTEL should not be allowed to prohibit Global NAPs from offering Foreign Exchange service to its customers using "virtual" NXX arrangements, given that the ILECs' costs are not affected by that practice and the companies themselves offer FX service in which "virtual" telephone numbers are assigned to the FX customer.

Q. Dr. Selwyn, can you summarize the issue concerning the use of "virtual" NXX arrangements that the Commission must arbitrate in this case?

A. Yes. In its negotiations with Global NAPs, ALLTEL has taken the position that Global NAPs should not be allowed to assign NXX codes to its customers that are homed to central office switches serving other rate centers.[45] Global NAPs and other ALECs employ non-geographic assignments of NPA-NXX codes, sometimes referred to as "virtual" NXX arrangements, in order to offer a service to their customers that competes directly with ALLTEL's own longstanding Foreign Exchange (FX) service. The ILECs consider those arrangements to amount to an evasion of the retail toll tariffs they apply to their own end users (who may place such calls), and thus want to compel ALECs to conform to their established local calling area definitions and a geographically-linked application of NPA-NXX codes.

Significantly, ALLTEL offers its own customers serving arrangements wherein the telephone number that is assigned to the customer is not rated in the same exchange as the customer is physically located and where the service is physically provided. One such service arrangement that ILECs have traditionally offered for decades is known as "Foreign Exchange" ("FX") service. By seeking the opportunity to define and utilize

45. See, Global NAPs Petition, at Issue 4; ALLTEL's Response, at 6.

virtual NXX codes, Global NAPs is seeking to provide its customers with services and serving arrangements that are comparable to and competitive with those currently being offered by ALLTEL.[46]

Q. You just referred to ILEC local calling areas — how do they enter in to the issue of "virtual" NXX code assignments?

A. Recall that a local calling area generally consists of one or more individual exchanges (sometimes referred to as "rate centers") to which customers may place calls without a toll charge ("outward local calling area") or from which customers may receive incoming calls without the calling party being subject to a toll charge for such calls ("inward local calling area"). An exchange is an administrative definition of a geographic area within which all customers receive identical rating and rate treatment with respect to both outgoing and incoming calls. In non-metropolitan areas, an exchange usually corresponds to the area served by a single wire center or central office switch. In metropolitan areas, an exchange may include an area served by more than one wire center.[47]

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46. *See*, ALLTEL Florida, Inc. General Subscriber Services Tariff, Foreign Exchange Service and Foreign Central Office Service, Section 9: Second revised page 1, Effective February 10, 1992.

47. The precise definition of a local calling area tends to be more complex. Over time, most states have established one or more "optional extended area calling" arrangements under which the same call might be rated as toll for a customer that does not subscribe to the extended arrangement, but local for one who does. However, I will use the term "local calling area" to refer to the rate centers that a subscriber can call without incurring a toll charge from a basic one-party flat rate residential (1FR) or business (1FB) access line, *i.e.*,

(continued...)

The definition of local calling areas is fundamental to the "virtual" NXX issue, because the only reason anyone would ever care about assigning a customer in one location a telephone number with an NXX code associated with another location — that is, the "virtual" NXX issue — is if it matters that the customer is not in the local calling area associated with the assigned telephone number. Traditionally, local calling area boundaries have served to delineate the rating treatment for an ordinary POTS call, *i.e.* whether it would be rated according to the ILEC's local service tariff, or whether toll charges would apply. In order to fully understand the ramifications of allowing "virtual" NXX code assignments, one first needs to consider how NPA-NXX codes are used for POTS call rating and routing.

Q. How does a telephone company determine, for any given call, whether it is a local call or if a toll charge applies?

A. The area code (NPA) and central office code (NXX) of a telephone number (NPA-NXX) are, with limited exceptions, mapped specifically to a particular exchange. For example, the 386-496 NPA-NXX uniquely specifies the Lake Butler exchange. There may be, and (particularly for urban areas usually are) more than one NPA-NXX code associated with an exchange; since the onset of local telephone service competition, some of the NPA-NXX codes may be "held" by the incumbent LEC while others may be assigned to ("held by") one or more ALECs. When a call is placed, the dialed number is examined by the originating central office switch to determine whether to route the call directly to

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47. (...continued)
the subscriber's home exchange and extended area service ("EAS") exchanges.

the central office serving the dialed NPA-NXX or whether to route the call through an intermediate switching entity known as a tandem switch. The central office thus "translates" the dialed number into a routing for the call. It may also determine, through a lookup in a reference table maintained in the switch itself, whether, based upon the dialed NPA-NXX code, the call is to be rated as "local" or "toll." In some cases, this determination may affect the dialing sequence that the customer is required to use in order to place the call. The rating of the call *for billing purposes* is also based upon the dialed NPA-NXX, with the billing software looking to reference tables for the treatment and applicable rate for a call originated at one NPA-NXX and terminated at another NPA-NXX.

Q. Why was the "local" versus "toll" distinction originally established in the early days of the telephone industry?

A. The "local" versus "toll" distinction essentially grew out of the architecture of the earliest telephone networks. Originally, an exchange generally referred to the geographic area served by a manual switchboard to which all of the telephone lines within that exchange were connected. An operator would complete "local" calls by physically plugging the calling party's line into the called party's line using a patch cord. If the call was destined to a customer served by a different switchboard (*i.e.*, in a different exchange), the operator would signal the terminating switchboard and instruct the operator at that location as to which phone line the call was to be connected. Generally, such "inter-exchange" calls were rated as "toll" and additional charges for the call would apply. For calls to nearby exchanges, direct trunks would interconnect the

individual switchboards; however, for longer distances, one or more intermediate switchboards would be involved in interconnecting trunks so as to achieve the desired end-to-end connection. Distance was thus a major factor in both the complexity and the cost of individual calls.

As the number of telephone lines increased and mechanized switches replaced cord switchboards, the "exchange" began to take on more *administrative* properties rather than the *physical* properties associated with individual switchboards. Multiple central office switches could — and did — serve the same "exchange," and local calling was extended to include nearby exchanges as well as the subscriber's "home" exchange. Nevertheless, maintaining a rating distinction between local and toll calls made sense for many years, because it generally reflected significant distance-based cost differences between the two classes of calls.

Q. In today's modern digital telecommunications networks, is the local/toll rating distinction still supported by distance-based cost differences between "local" and "toll" calls?

A. No, it is not. The explosion in telecommunications technology over the past two decades, and particularly the enormous gains in fiber optic transmission systems capacity that I discussed earlier in my testimony (page 17), has reduced the cost of telephone usage to a mere fraction of a cent per minute. It also has made any physical distinction that may have once existed as between "local" and "toll" calls all but obsolete, and has essentially eliminated *distance* as a cost-driver for all telephone calls. Thus, the retention of current local calling areas smaller than a LATA amounts to no more than a regu-

latory fiction, one that could not be sustained were the local exchange market truly competitive.

Q. Has distance in fact ceased to be a basis for pricing in those sectors of the telecommunications industry that are now or that have become robustly competitive?

A. Yes. It is now widely recognized that both the long distance and wireless service markets are characterized by intense competition. Distance has all but disappeared entirely in interstate long distance pricing structures. Under most of the pricing plans being offered by interexchange carriers to residential and business consumers, the price of a 364-mile interstate toll call from Lake Butler to Tunnel Hill, Georgia is exactly the same as the price of a cross-country call from Lake Butler to San Diego. Notably, AT&T recently introduced an "AT&T Unlimited Plan" that offers unlimited interLATA and intraLATA direct-dialed toll calling to other AT&T residential toll subscribers for $19.95 a month, with a distance-insensitive charge of $0.07 per minute for the same types of calls to non-AT&T subscribers.[48] Distance-based charges have also virtually disappeared in the *international* long distance market as well, although country-specific price differences, based upon factors *other than distance*, persist.

Wireless carriers have also largely eliminated distance as a pricing element. Prior to the entry of PCS competition, cellular carriers offered very limited local calling areas (often replicating precisely the local calling area defined by the ILEC for the exchange in

48. Source: "AT&T Unlimited Plan", http://www.shop.att.com/wrapper?portal=shopatt&bannerid=ILB011DRTTV&product=shopatt_orp2p), downloaded 9/26/02

which a particular cell phone was rated), and also imposed high "roaming" charges for outward calls that were originated outside of the customers "home" service territory (even where the call was originated from another service territory controlled by the same cellular carrier). As PCS carriers came into the market, they began to offer extended, sometimes *nationwide*, local calling, and have also introduced calling plans that eliminate most or all roaming charges. Both Sprint PCS and AT&T Wireless Services have been offering standard calling plans that make no distinction as between "local" and "long distance" calls or otherwise charge on the basis of distance.[49] Competitive pressure from these companies has forced incumbent cellular carriers such as Verizon Wireless or Cingular Wireless (the new entity produced by the merger of SBC's and SBC/SNET's wireless operations) to adopt similar distance-insensitive pricing plans. For example, Cingular Wireless offers an array of "Cingular Nation" calling plans that are marketed as having "no U.S. roaming or nationwide long distance charges" for calling anywhere within the 50 states.[49] ALLTEL offers a similar service with its "Total Freedom" calling plan.[50]

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49. The"Real Nationwide Long Distance Included" plans currently offered by Sprint PCS provide various usage packages for a flat monthly fee, after which a distance-insensitive charge of $0.40 per minute applies. See, http://www1.sprintpcs.com/explore/servicePlansOptionsV2/PlansOptions.jsp (accessed 09/26/02).

49. The plans offer varying levels of usage for a flat fee, after which a distance-insensitive charge of $0.35 per-minute applies. *See*, http://www.cingular.com/index_flash.html, accessed 9/26/02.

50. For a monthly fee of $49.95, this plan offers 350 anytime minutes, and 3500 night and weekend minutes Additional minutes are $0.35 and are distance insensitive. See, http://estore.alltel.com (accessed 9/26/02).

In fact, one of the *only* segments of the telecommunications industry where distance-based pricing (in the form of local/toll distinctions and/or mileage-based rates) persists is in the largely noncompetitive *local* telecommunications sector; indeed, the fact that this pricing remnant of a monopoly era persists in the case of local telephone services serves to *confirm* the utter lack of effective competition in this sector.

Q. Is it appropriate for competing carriers to adopt local calling area definitions that differ from those of the ILEC?

A. Indeed it is. One of the primary public policy goals of introducing competition into the local telecommunications market has been specifically to encourage and stimulate innovation in the nature of the services that are being offered. ALECs should not be limited to competing solely with respect to *price*, nor should they be expected to become mere "clones" of the ILEC with respect to the services they offer. And indeed, the extent of the local calling area is itself becoming something that some ALECs see as an opportunity to differentiate their products from those being offered by the ILEC. An ALEC might, for example, offer its customers a larger local calling area than that being offered by the ILEC as a means for attracting customers or, alternatively, might choose to offer a *smaller* local calling area than the ILEC's service provides, at a correspondingly lower price. ILECs themselves are also changing the definition of "local calling area" by introducing optional calling plans that provide for extended area local calling including, in some cases, all exchanges within the subscriber's LATA. Indeed, BellSouth -

Georgia offers an "Area Plus® Service" that provides residence subscribers unlimited LATA-wide calling for $35.00 per month.[51]

As the Commission has just recently concluded, use of the ILEC's definition of "local calling areas" will effectively prevent ALECs from offering their customers anything different:

> Using the ILEC's retail local calling area appears to effectively preclude an ALEC from offering more expansive calling scopes. Although an ALEC may define its retail local calling area as it sees fit, this decision is constrained by the cost of intercarrier compensation. An ALEC would be hard pressed to offer local calling in situations where the form of intercarrier compensation is access charges, due to the unattractive economics.[52]

And, in fact, the Commission has required that the *retail local calling areas* as defined by the *originating local carrier* be used as the default for purposes of determining where reciprocal compensation, rather than access charges, are to be paid to the terminating carrier:

> Based on the foregoing, we find that it is appropriate to establish a default local calling area for purposes of reciprocal compensation. This issue appears with enough frequency that a default definition is needed for the sake of efficiency. A default should be as competitively neutral as possible, thereby encouraging

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51. See BellSouth -Georgia General Subscriber Service Tariff, Section A3.42, Fourth Revised Page 42 (effective August 20, 2001). This type of arrangement highlights that even in the case of ILECs, the distinction between "local" and "toll" is largely arbitrary in terms of network technology and the underlying costs of providing service.

52. *Investigation into appropriate methods to compensate carriers for exchange of traffic subject to Section 251 of the Telecommunications Act of 1996*, Florida PSC Docket No. 000075-TP (Phases II and IIA), *Order on Reciprocal Compensation*, Order No. PSC-02-1248-FOF-TP, Issued September 10, 2002 (*"Reciprocal Compensation Order"*), at 53.

> negotiation and development of business solutions. On this basis, we find that the originating carrier's retail local calling area shall be used as the default local calling area for purposes of reciprocal compensation.[53]

This is not to say that establishing larger local calling areas — whether inward or outward — will necessarily be the optimal competitive strategy for all ALECs, or even for the ILEC. One of the effects of decades of tight regulation of ILEC local service plans has been that we don't really know what combinations of price, inward/outward calling areas, and other features will appeal to different segments of the market. So, for an initial period — in fact, likely lasting for several years — I would expect to see different ALECs experimenting with different service plans, as long as regulators grant them the necessary flexibility to do so and ILECs don't economically constrain these offerings.

Q. How important is it to ALECs such as Global NAPs to be granted the flexibility to make non-geographic assignments of NPA-NXX codes to their customers?

A. It is extremely important, because such "virtual" NXX use of code assignments allows ALECs such as Global NAPs to compete with traditional Foreign Exchange ("FX") services being offered by ILECs. In fact the Commission found in its *Reciprocal Compensation Order* that use of virtual NXX codes by ALECs is a legitimate competitive response to ILECs traditional FX service.[54] The problem is that in the case of incoming calls, the local calling area applicable to the *calling party* (who we can assume

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53. *Id.*, at 54-55.

54. *Reciprocal Compensation Order,* at 28.

is most likely to be an ILEC customer) will necessarily govern the rate treatment for the call. Recall from our earlier discussion that the determination as to whether a particular call is to be rated as local or toll will be based upon the NPA-NXX code of the called telephone number. An ALEC can define an expanded *outward* local calling area for its customer simply by placing the NPA-NXX codes for one or more additional exchanges into the (outward) local rating table of its switches. Under current rules, however, there is no corresponding requirement for an ILEC to symmetrically place the same NPA-NXX code(s) within the local rate tables of *its* switches, so that ordinarily calls to those NPA-NXXs will be rated at toll calls. However, the "virtual" NXX solution allows an ALEC to compete with ALLTEL's FX service.

Q. Does it constitute an evasion of the ILEC's toll tariff if an ALEC uses the "virtual" NXX method to establish one or more locally-rated inbound routes that otherwise would be subject to toll rates if placed to an ILEC subscriber in the same rate center ?

A. No, not in my opinion. As I have explained earlier in my testimony, the prevailing distinction between "local" and "toll" is an artifact of historic network architectures and technological conditions that may no longer be applicable. There is no reason why competitive marketplace forces should not be permitted to expand or otherwise reshape the traditional definition of "local calling" and perhaps to eliminate the notion of "intraLATA toll" altogether, especially given that call distance no longer influences costs in the manner that it did when the "local" versus "toll" pricing distinction was first established.

Moreover, as I have noted, the ILECs have for many years offered Foreign Exchange (FX) services, which allow customers to expand their inward local calling areas in essentially the same way that ALECs seek to do through "virtual" NXX arrangements.[55] In fact, some ILECs have described the ALECs' expanded inward calling area services as a "Virtual Foreign Exchange" type of service.

Q. Dr. Selwyn, ALLTEL seems to be saying that the rates and quality of basic local telephone service would potentially be at risk because ALLTEL's revenues from toll and access charges would be diminished if ALEC VNXX arrangements are allowed.[56] Has ALLTEL demonstrated that this is a credible risk?

A. No. Global NAPs should not be required to pay access charges on calls that traverse routes that ALLTEL treats as toll. While a competitive loss of retail sales to Global NAPs might well erode *shareholder earnings*, there is no basis upon which the Commission can conclude that any such loss would so adversely impact ALLTEL's financial position as to invoke extraordinary relief measures or put any of its franchised services at risk. Indeed, past attempts by ILECs to explicitly recover "competitive losses" have been soundly rebuffed by state regulators. For example, the California PUC soundly *rejected* claims by Pacific Bell and GTE (now Verizon) that they should

55. *See*, ALLTEL Florida, Inc. General Subscriber Services Tariff, Section 9, Second revised page 1, Effective: February 10, 1992.

56. *See,* ALLTELL's Response, at para. 18. ALLTELL avers it would assume "undue economic burden" should Global NAPs be allowed to define its local calling area on a LATA-wide basis.

be made whole with respect to their "competitive losses." The California Commission concluded that:

> Assuring the LECs recovery of competitive losses would undermine the incentive that NRF was intended to create. ... Compensating for competitive loss would force the LECs' customers to shelter [the requested amounts] of toll revenue from competitive risk even after rates are rebalanced, effectively granting the LECs rate cap returns on those revenues. This would be inconsistent with the ratepayer safeguards and LEC incentives established in NRF. Moreover, Pacific's and GTEC's competitors have no captive markets to provide them with a steady revenue stream if they are inefficient. ... Therefore, Pacific's and GTEC's requests for compensation for competitive losses are denied.[57]

Q. How does a traditional ILEC FX service work?

A. Suppose that a customer located in exchange A might want a local telephone number presence in exchange B, from which exchange A would otherwise be a toll call. A caller in exchange B dials the FX number as a local call to exchange B, yet the call is physically delivered to the FX customer located in exchange A. Usually, but not always, the FX service involves a leased line connecting the central offices in the two exchanges. The FX customer pays for the dial tone line in exchange B and pays for the leased line between exchange B and exchange A. Sometimes, the ILEC may elect to provision the FX service via a switched rather than a dedicated interexchange connection. Such an arrangement, if used, is (supposed to be) transparent to the customer, who will still be charged a flat monthly rate for the leased line. Regardless of how the FX service is

57. California Public Utilities Commission, Investigation (I.) 87-11-033, *Alternative Regulatory Frameworks for Local Exchange Carriers*, Decision (D.) 94-09-065, *Implementation and Rate Design*, 56 CPUC 2d 117, 210-211.

priced by the ILEC, the essential fact is that the ILECs have tariffed FX services that allow their end users to place calls to points beyond their local calling area and avoid incurring toll charges, just as ALECs such as Global NAPs seek to do by offering the "virtual FX" services made possible by non-geographic NPA-NXX code assignments.

Through their use of virtual NXX codes, ALECs are merely competing with ILECs for FX customers, and this level of competition is exactly the type of response one would see in a emerging competitive marketplace. As I have previously discussed, the Commission, in its *Reciprocal Compensation Order,* explicitly and specifically recognized that virtual NXX services that are offered by ALECs and traditional FX services being offered by ILECs are one and the same:

> We believe that virtual NXX is a competitive response to FX service, which has been offered in the market by ILECs for years. Differing network architectures necessitate differing methods of providing this service; nevertheless, we believe that virtual NXX and FX service are similar "toll substitute services." Therefore, we believe carriers should be permitted to assign NPA/NXXs in a manner that enable them to provision these competitive services.[58]

As long as ILECs such as ALLTEL continue to provide local call rate treatment with respect to calls placed to or from FX lines, the *Reciprocal Compensation Order* requires that "carriers should be permitted to assign NPA/NXXs in a manner that enable them to provision these competitive services,"[59] and that means the use by ALECs of virtual NXX number assignments.

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58. *Reciprocal Compensation Order*, at 28.

59. *Id,* at 28.

ALLTEL's transport costs are entirely unaffected by the location at which Global NAPs terminates an ALLTEL-originated call to a Global NAPs customer.

Q. Dr. Selwyn, consider the case where an ALLTEL end user places a call to a customer served by Global NAPs in Florida. Would the costs incurred by ALLTEL vary at all depending upon whether Global NAPs delivered that call to a telephone number with a geographic NPA-NXX code assignment, versus a non-geographic assignment?

A. No, not at all. As I shall demonstrate, the costs that an ILEC incurs in carrying and handing off originating traffic to ALECs is entirely unaffected by the location at which the ALEC delivers the call to the ALEC's end user customer. As long as the ALEC establishes a POI within the LATA, it should be allowed to offer service in any rate center in the LATA and to terminate calls dialed to that rate center at any location it wishes. Thus, it is entirely reasonable and appropriate that ALECs be permitted to assign NPA-NXX codes to end users outside the rate center in which the NPA-NXX is homed and still be entitled to full reciprocal compensation with respect to such calls.

To be sure, an ILEC's *revenues* may well be affected by, for example, an ALEC's decision to offer a larger local calling area than that being offered by the ILEC, but that impact is a *competitive loss* to the ILEC to which it has ample opportunity to respond competitively, for example, by offering its own customers expanded inward (and perhaps outward as well) local calling. An ILEC should not be permitted to escape the financial consequences of its failure to successfully compete by refusing to compensate other competing carriers for work that they have legitimately performed, nor should it be

permitted to prevent its competitors from introducing new and innovative services that amount to more than merely parroting of the ILEC's traditional offerings.

Q. How is it that the cost to the ILEC is not affected by the location at which the ALEC delivers traffic to its customers?

A. Perhaps the best way to explain this point is by way of examples. Please refer to Figure 1 below. In this example, the call is originated by an ILEC customer in Hilliard and is delivered by the ILEC to a ALEC in Lake Butler via a Point of Interconnection located in Hilliard. The ALEC's customer to whom the call was directed is also located in Hilliard, and so the ALEC needs to transport the call back to the delivery point in Hilliard. In this example, both of the ILEC's conditions for reciprocal compensation have been met, *i.e.*, the POI is located within the local calling area of the originating ILEC access line (*i.e.*, in Hilliard), and the call is terminated to an ALEC customer who is also located within the local calling area of the originating ILEC access line in Hilliard.

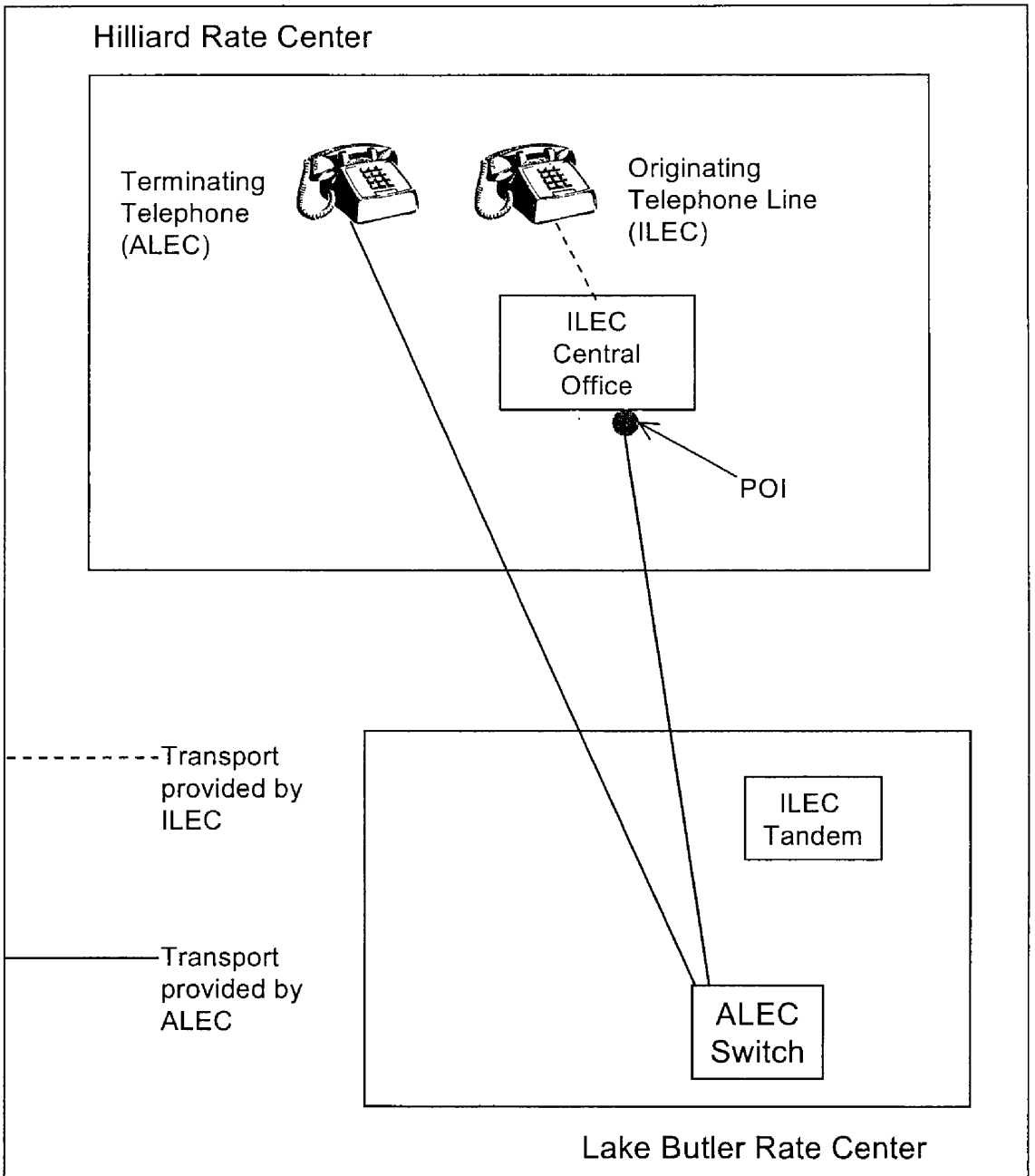

Figure 1. Call originated by an ILEC customer in Hilliard to a ALEC customer in Hilliard and delivered by the ILEC to a ALEC in Lake Butler via a Point of Interconnection located in Hilliard.

Now let's change the facts of this example so as to violate one of the two assumed conditions for reciprocal compensation. Here, the ILEC's Hilliard customer still dials a Hilliard telephone number (*i.e.*, an ALEC NPA-NXX that is rated to), but instead of the ALEC delivering the call to an ALEC customer in Hilliard as in the previous example, the ALEC delivers the call to an ALEC customer physically located in Lake Butler. Note that the POI at which ILEC hands off the call to the ALEC is still in Hilliard, *i.e.*, still within the local calling area of the ILEC access line that originated the call. In this circumstance, the physical location of the point of delivery (Lake Butler in this case) is not within the local calling area of the originating ILEC telephone and, as I understand it, an ILEC placing such limits on reciprocal compensation would argue that this is not a "local" call and that no reciprocal compensation is required in this case.

Q. Is there any difference in the work that ILEC would be required to perform in handing off the originated call to the ALEC as between these two examples?

A. No, and that is the essential point of these examples: In both of these cases, the ILEC's work — and its costs — are absolutely identical. The sole distinction between the two examples lies in what the *ALEC* does once it receives the call from ILEC at the POI. In the first case (Figure 1), the ALEC hauls (transports) the call all the way back from Hilliard to Lake Butler; in the second case (Figure 2), the ALEC delivers the call to a customer located near its Lake Butler switch. In both of these cases, the ILEC carries the call from the originating telephone to the Hilliard POI, and so its work is entirely unaffected by where the ALEC ultimately delivers the call.

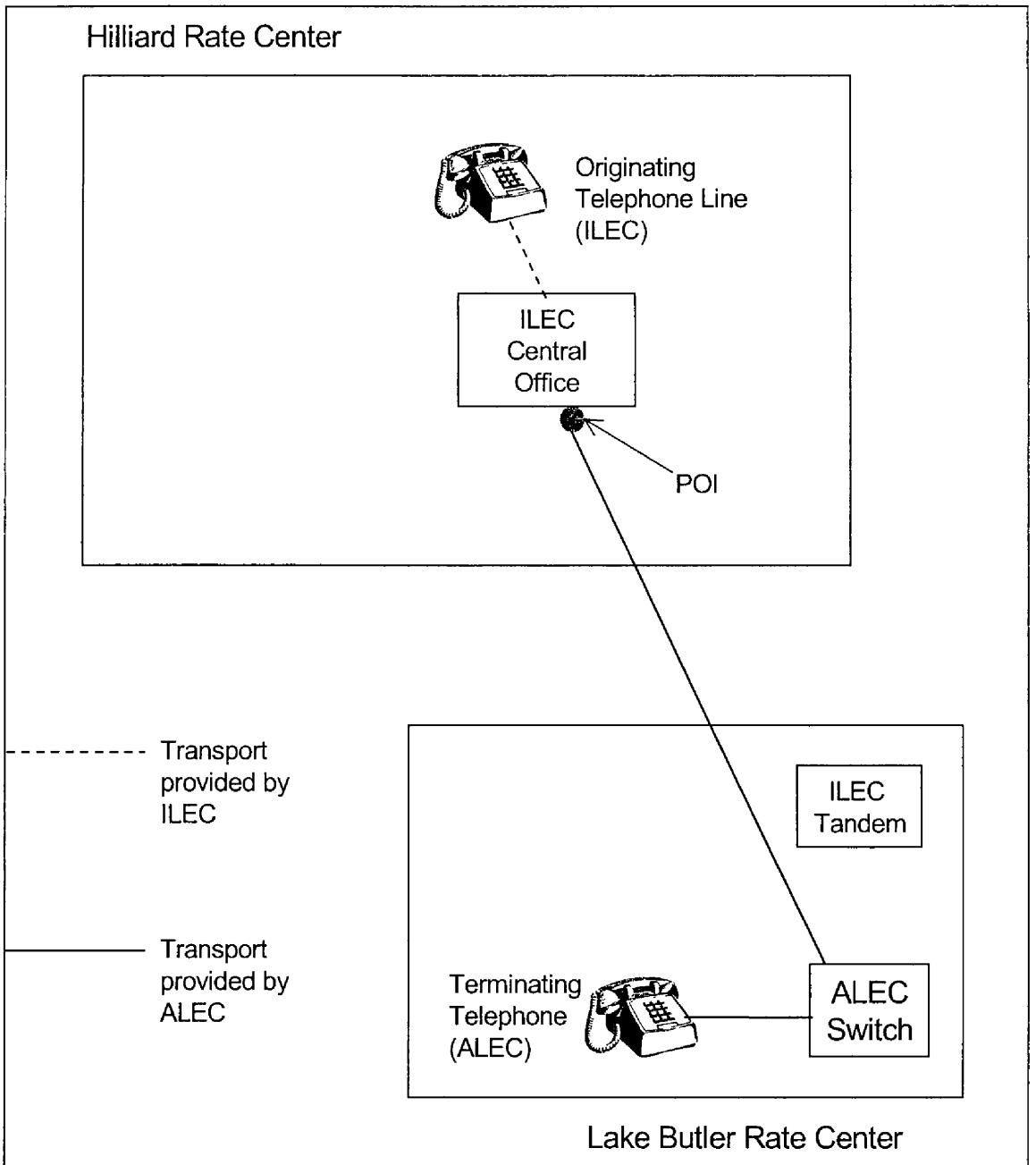

Figure 2. Call originated by an ILEC customer in Hilliard to a ALEC customer in Lake Butler and delivered by the ILEC to a ALEC in Lake Butler via a Point of Interconnection located in Hilliard.

Q. What if you were to eliminate the condition that a Point of Interconnection must be established in each local calling area. Does the location of the point of delivery by the ALEC to its end user customer then affect the ILEC's costs?

A. No, it does not. To see why, please refer to Figures 3 and 4 below, which correspond with Figures 1 and 2, respectively, except that in these two cases I am assuming that the POI is located in Lake Butler. In Figure 3, the ILEC customer in Hilliard dials an ALEC number rated to Hilliard. Because the POI is in Lake Butler, the ILEC is required to transport the call over its network to Lake Butler, where it is handed off to the ALEC. As in Figure 1, the ALEC then transports the call *over the ALEC's network* back to Hilliard for delivery to its customer. In Figure 4, the ILEC customer in Hilliard also dials an ALEC number rated to Hilliard, and the ILEC transports the call to the POI in Lake Butler. However, as in Figure 2, the call is then delivered by the ALEC to an ALEC customer in Lake Butler rather than in Hilliard. As was the case as between Figures 1 and 2, there is absolutely no difference in the work that the ILEC is called upon to perform as between Figures 3 and 4. In both of these cases, the ILEC transports the originating call from its Hilliard customer to the ALEC POI in Lake Butler; *the location where the ALEC ultimately delivers the call has no effect whatsoever upon ILEC's work or its costs.*

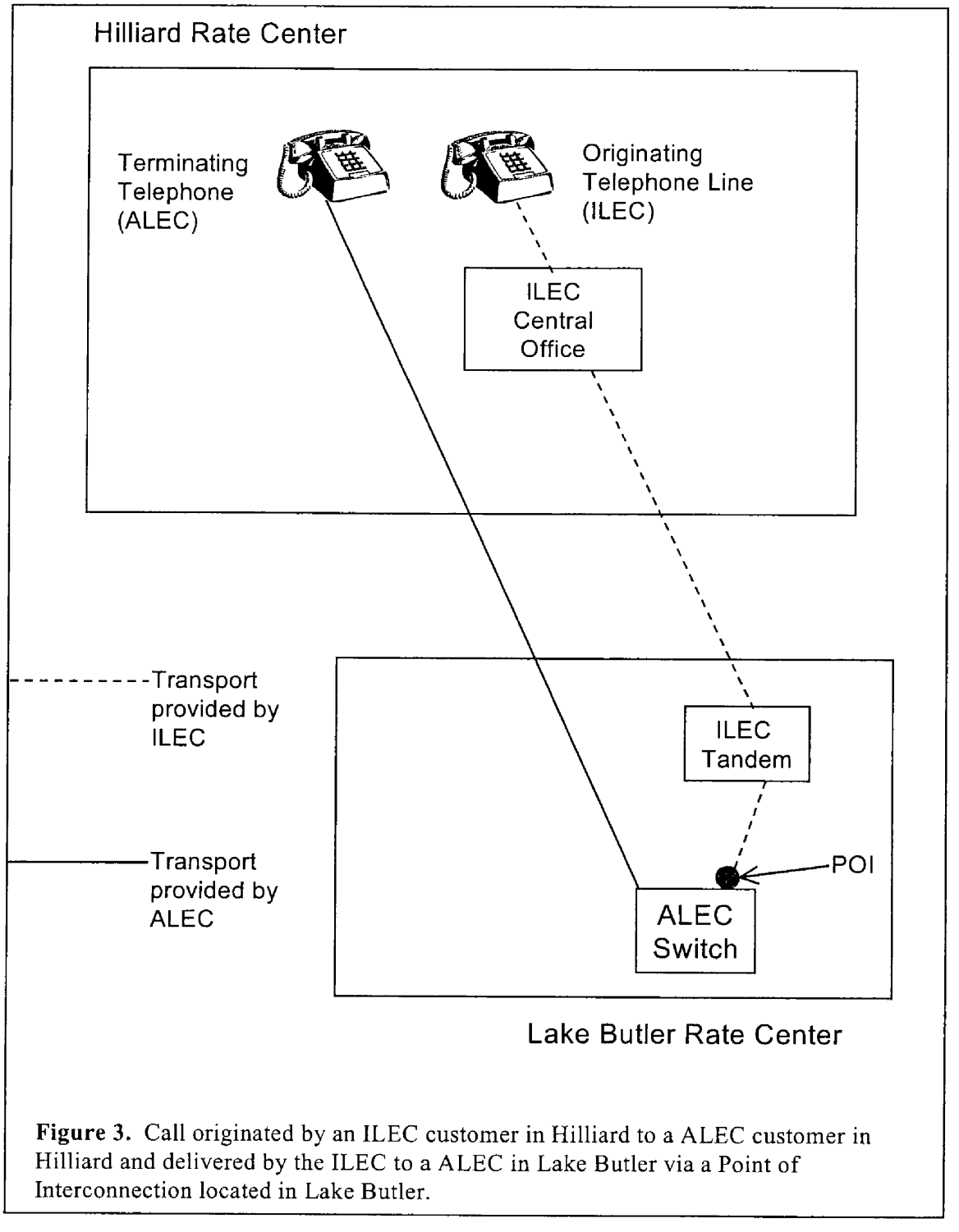

Figure 3. Call originated by an ILEC customer in Hilliard to a ALEC customer in Hilliard and delivered by the ILEC to a ALEC in Lake Butler via a Point of Interconnection located in Lake Butler.

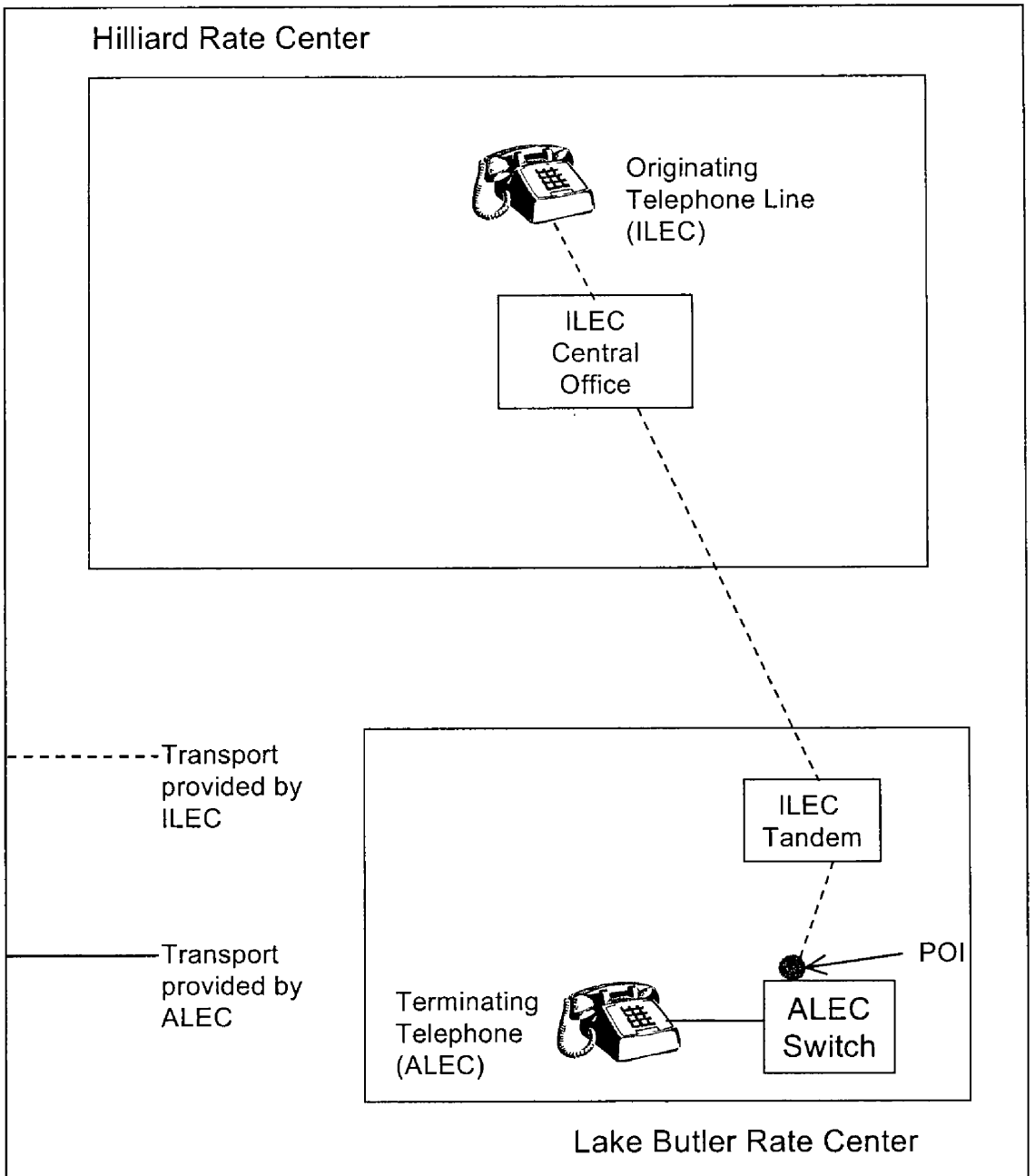

Figure 4. Call originated by an ILEC customer in Hilliard to a ALEC customer in Lake Butler and delivered by the ILEC to a ALEC in Lake Butler via a Point of Interconnection located in Lake Butler.

Q. You have suggested that the only impact upon the ILEC arising out of Global NAPs' decision as to the point of delivery of a given call lies in the possibility that the ILEC might sustain a competitive loss. Please elaborate on this point.

A. Suppose that, under the ALLTEL tariff, a toll charge may apply for calls beyond a certain distance or between non-contiguous exchanges, whereas an ALEC, in an effort to differentiate its service from that of the ILEC and also to offer potential customers some additional service features that are not being offered by the ILEC, treats some or these calls as "local" and thus imposes no specific charge for the call. If, as a result of the ALEC's offering, some of the ILEC's customers are persuaded to switch over to the ALEC's service, the ILEC will sustain a loss of both local and toll revenue. *Such a loss of business is a direct and inescapable outcome of competition*; ALLTEL can either respond by reducing or eliminating its own (toll) charges for these calls (thereby sustaining some revenue loss), or risk losing customers to the less expensive ALEC service (thereby also sustaining some revenue loss). The issue here is entirely one of *pricing and competitive response*, not one of policy. In many cases, however, even that potential loss of revenue can be overcome if adopts more competitively rational pricing metrics.

Q. You stated that in some cases ALLTEL may sustain a loss of toll revenue. Why would that not arise in *all* cases where the ALEC provides "free" service over a route for which the incumbent imposes a charge?

A. This is because in many cases where the incumbent imposes a charge the customer does not use the service at all. For example, as we have previously discussed, many customers reach their Internet Service Provider ("ISP") by dialing a number rated in the customer's home community that the LEC (ALLTEL or an ALEC) ultimately delivers to the ISP at a distant point. In the examples we were discussing earlier and that are illustrated in Figures 1 through 4, suppose that the ISP customer takes local telephone service from ALLTEL in Hilliard, and that the call is handed off to an ALEC, which then delivers the call to an ISP in Lake Butler. One might argue that this arrangement deprives ALLTEL of the toll revenue it would otherwise have received were this virtual FX arrangement not in place. In reality, the Hilliard customer would have been unlikely to have called the Lake Butler ISP on a toll call basis in the first place, and would instead have selected a different ISP with a Hilliard presence; chosen another (non-dial up) method to access the Internet; or simply not used the Internet at all. In any case, ALLTEL would not have received any toll (or expanded "local") revenue. Hence, in this circumstance, the only "revenue loss" to ALLTEL is a theoretical one based upon the "what might have been" rather than the "what actually was."

Q. To summarize your recommendation, is there any merit in ALLTEL's position that Global NAPs should not be permitted to utilize virtual NXX assignments and rating arrangements?

A. No, and for the Commission to accede to their position on this issue would have the effect of denying Global NAPs the opportunity to offer exactly the same types of

services that ALLTEL itself can provide, and thereby to inappropriately protect ALLTEL from competitors.

INTERCARRIER COMPENSATION ISSUES

From an economic and policy perspective, the appropriate intercarrier compensation for the termination and transport of ISP-bound local calls, as well as other forms of local traffic, is a symmetric rate based upon the ILEC's prevailing TELRIC cost level, which creates incentives for continual reductions in the costs of call termination services and harms neither ILECs nor end users.

Q. Dr. Selwyn, what rules currently govern the intercarrier compensation payments applicable to calls that are made to an Internet Services Provider?

A. While I am not offering a legal opinion, my understanding is that the FCC's *ISP Remand Order*[60] currently governs the intercarrier compensation payments that must be made when a locally-rated dial-up call to an Internet Services Provider (ISP) is handed off from the originating carrier to another carrier for completion. That order represents the FCC's second effort to impose a federally-mandated distinction between ISP-bound calls and all other locally-rated traffic that is subject to reciprocal compensation for intercarrier compensation purposes (so-called "Section 251(b)(5) traffic").

Q. Can you briefly summarize the history of those efforts?

A. Yes. In February 1999, the FCC issued a *Declaratory Ruling* which held that such calls are jurisdictionally mixed, but largely interstate; and that because ISP-bound calls were

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60. *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 and Intercarrier Compensation for ISP-Bound Traffic*, CC Docket Nos. 96-98 and 99-68, *Order on Remand and Report and Order,* FCC 01-131 (rel. April 27, 2001) ("*ISP Remand Order*").

"non-local interstate traffic" to which Section 251(b)(5) did not apply, state commissions were free to determine whether or not reciprocal compensation payments should apply to that traffic when arbitrating new interconnection agreements.[61] However, in March 2000, the D.C. Circuit Court of Appeals vacated and remanded the *Declaratory Ruling* "for want of reasoned decision-making."[62] In April of this year, the FCC released the *ISP Remand Order*, in which it concludes once again that ISP-bound calls are exempt from the reciprocal compensation obligations of Section 251(b)(5), although it bases that conclusion on what appears to be an entirely different legal analysis than that put forth in the *Declaratory Ruling.*[63] In a parallel action, the FCC also issued a *Notice of Proposed Rulemaking* to consider more permanent intercarrier compensation arrangements for ISP-bound traffic (as well as other types of calls).[64] On May 3, 2002, the D.C. Circuit Court of Appeals issued a ruling that remanded the *ISP*

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61. *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 and Intercarrier Compensation for ISP-Bound Traffic*, CC Docket Nos. 96-98 and 99-68, *Declaratory Ruling in CC Docket No. 96-98 and Notice of Proposed Rulemaking in CC Docket No. 99-68*, FCC 99-38 (rel. February 26, 1999) ("*Declaratory Ruling*"), at paras. 18-20 and 26.

62. *Bell Atl. Tel. Cos. V. FCC*, 206 F.3d 1 (D.C. Cir. 2000)("*Bell Atlantic*"). Specifically, the Court found that the FCC had applied an "end-to-end analysis" that had been formerly used to determine calls' jurisdictional status, without explaining why that analysis was relevant to evaluating whether ISP-bound calls fit within the definition of Section 251(b)(5) traffic. *Id.* at 17.

63. *See ISP Remand Order* at paras. 31-47 (finding that ISP-bound traffic falls within the categories enumerated by Section 251(g), which are exempted from the reciprocal compensation requirements of Section 251(b)(5)).

64. *Intercarrier Compensation NPRM.*

Remand Order back to the FCC, but did not vacate that order.[65] Counsel advises me that the *ISP Remand Order* consequently remains in effect today.

Q. What are the particular rules established by the *ISP Remand Order*?

A. The *ISP Remand Order* establishes specific rates and terms for intercarrier compensation for ISP-bound traffic on an interim basis, including the following provisions:

- For six months following the effective date of that order, intercarrier compensation for ISP-bound traffic was to be capped at $0.0015 per minute of use (MOU); thereafter, the compensation rate would fall to $0.0010 / MOU for the next eighteen months, and thence to $0.0007 / MOU thereafter pending further FCC action;[66]

- A LEC's total compensation for termination of ISP-bound traffic is limited in each of the years 2001-2003 to its historical levels, plus a "growth factor" ranging from zero to ten percent;[67] and

65. *WorldCom, Inc. V. FCC*, No. 01-1218 *et al* (D.C. Cir. May 3, 2002).

66. *ISP Remand Order*, at para. 78.

67. *Id.*, at para. 78. The specific formulas to be applied are given therein.

- A rebuttable presumption is applied that traffic out of balance by more than a 3:1 ratio is ISP-bound terminating traffic to which the ISP compensation rates and limits will apply.[68]

In addition, the *ISP Remand Order* established a separate rule that is most relevant to the circumstances in the instant proceeding. Namely, when carriers have not been exchanging traffic under interconnection agreements before the *ISP Remand Order* was adopted (which I understand to be the case for Global NAPs and ALLTEL), then bill-and-keep is to be applied to ISP-bound traffic on an interim basis.[69]

Because the FCC was concerned about the "superior bargaining power of incumbent LECs" relative to ALECs seeking interconnection, it has conditioned the application of its intercarrier compensation rules for ISP-bound traffic to the ILEC's acceptance of the same rules for all forms of traffic subject to Section 251(b)(5), including local traffic exchanged with CMRS providers.[70] The FCC allows ILECs to make this election on a state-by-state basis.[71] My understanding is that ALLTEL has made this election,[72] so that all Section 251(b)(5) traffic that ALLTEL exchanges with another carrier (including Global NAPs) would be subject to bill-and-keep without monetary compensation.

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68. *Id.*, at para. 79.

69. *Id.* at para. 81.

70. *Id.* at para. 89.

71. *Id.*, at footnote 179.

72. Global NAPs Petition, at para. 38.

Q. Notwithstanding the applicability of the rules established by the *ISP Remand Order* to the instant case, does the proposal by ALLTEL to utilize bill and keep for "local" traffic represent a reasonable form of intercarrier compensation from an economic and policy standpoint?

A. No, it does not. As a general matter, the most appropriate form of intercarrier compensation for the termination and transport of ISP-bound local calls, as well as other forms of local traffic, continues to be a symmetric rate based upon the ILEC's prevailing TELRIC cost level, which creates incentives for continual reductions in the costs of call termination services and harms neither ILECs nor end users. These incentives and the positive market developments they engender were expressly recognized by the FCC in 1996, when it designed the reciprocal compensation rules that continue to be applied on a default basis to local telecommunications traffic subject to Section 251(b)(5).[73] Despite the fact that the FCC recognized the limited applicability of bill-and-keep at that time, and that bill-and-keep was strenuously opposed by several of the ILECs, the FCC has seized upon mandatory bill-and-keep as a "solution" to the problem that it believes has been created by the rapid growth in providers of specialized call termination services, including but not limited to termination of ISP-bound calls. However, a thorough analysis of the economic and policy foundations to intercarrier compensation, as applied to ISP-bound calls and other telecommunications traffic, leads to the conclusion that mandatory bill-and-keep would fail to be an efficient or equitable form of intercarrier compensation, and in fact would seriously disadvantage ALECs in favor of ILECs in a manner contrary to the *Act.*

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73. *See* the FCC's *Local Competition Order.*

Q. Have you undertaken such an analysis?

A. Yes. In August of 2001, ETI's Vice President, Scott C. Lundquist, and I prepared a report that examines in detail the economic and policy issues associated with intercarrier compensation arrangements for interconnecting telecommunications carriers entitled *Efficient Intercarrier Compensation Mechanisms for the Emerging Competitive Environment*, attached hereto as Attachment 4.[74]

Q. Can you summarize the principal findings contained in that report?

A. Yes. One focus of our report was to respond to two papers published by the FCC's Office of Plans and Policy (OPP) which the FCC cited in the *Intercarrier Compensation NPRM* as support for adopting a mandatory bill-and-keep framework for intercarrier compensation. In brief, our report identifies four main flaws in those papers:

(1) The OPP papers fail to recognize the intrinsic linkage between the method adopted for intercarrier compensation and the retail prices paid by end users, which causes their analyses to be fundamentally incomplete, and fail to appreciate the enormous disruptions and formidable regulatory burdens that would arise in the attempt to transition to their proposed "bill-and-keep" arrangement.

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74. This report was originally submitted in the FCC's Intercarrier Compensation rulemaking, CC Docket No. 01-92, as an attachment to the August 21, 2001 Comments of Focal Communications Corp., Pac-West Telecomm, Inc., RCN Telecom Services, Inc. and US LEC Corp.

(2) The papers make certain assumptions concerning the allocation of the benefits and costs of a call between the calling and called parties, assumptions that are unsupported by any factual evidence and that are most likely wrong as an empirical matter.

(3) The papers inconsistently combine theoretical and pragmatic considerations to support their concrete proposals for how interconnection should be priced.

(4) The papers unduly defer to existing architectures and practices of ILECs, in effect requiring entrants to accept what amounts to a "take-it-or-leave-it" set of interconnection conditions, such as existing ILEC local calling area definitions and the premise that inward and outward traffic that is out-of-balance is categorically to be discouraged.

Neither of the OPP papers provides a sound economic or policy basis for regulators to impose "bill-and-keep" arrangements as the preferred solution for intercarrier compensation on ISP-bound calls and other locally-rated traffic. The other principal findings of our report are as follows:

- The perceived "problems" with the existing intercarrier compensation mechanism of explicit reciprocal compensation payments — traffic imbalances and the growth in payments by ILECs to ALECs for termination of ISP-bound calls — are properly viewed as the outcome of exactly the type of competition that the *Telecommunications Act of 1996* and the FCC's *Local Competition Order* was intended to

promote, and do not represent market "failures" that must be remedied by further regulatory intervention.

- Despite the recent revival of interest in a bill-and-keep model for intercarrier compensation — which was flatly opposed by most ILECs when first considered in post-*Act* arbitrations and regulatory proceedings to establish reciprocal compensation rates — the economics of bill-and-keep have not changed from the period when the FCC previously concluded that it was reasonable to apply *only* when carriers exchanged traffic that was roughly balanced so that *mutual* compensation would take place.

- When evaluated using appropriate criteria, including economic efficiency, competitive neutrality, and impacts upon end users, neither bill-and-keep nor other options that have been considered for application to ISP-bound traffic, including traffic imbalance thresholds and access charge treatment, would provide a satisfactory alternative to the existing form of reciprocal compensation arrangements.

Q. What are your recommendations at this time to the Commission concerning the application of intercarrier compensation to locally-rated traffic exchanged between Global NAPs and ALLTEL?

A. In the event that the Commission determines at some future point that the specific intercarrier compensation rules set forth in the FCC's *ISP Remand Order* do not apply to

locally-rated traffic exchanged between Global NAPs and ALLTEL (*e.g.*, as a result of an appellate court ruling to reverse, vacate, or stay the *ISP Remand Order*), the Commission should apply a symmetric, TELRIC-based reciprocal compensation rate consistent with the findings and supporting analysis presented in our report.

Q. Does this conclude your direct testimony at this time?

A. Yes, it does.

Attachment 1

Statement of Qualifications

LEE L. SELWYN

Dr. Lee L. Selwyn has been actively involved in the telecommunications field for more than twenty-five years, and is an internationally recognized authority on telecommunications regulation, economics and public policy. Dr. Selwyn founded the firm of Economics and Technology, Inc. in 1972, and has served as its President since that date. He received his Ph.D. degree from the Alfred P. Sloan School of Management at the Massachusetts Institute of Technology. He also holds a Master of Science degree in Industrial Management from MIT and a Bachelor of Arts degree with honors in Economics from Queens College of the City University of New York.

Dr. Selwyn has testified as an expert on rate design, service cost analysis, form of regulation, and other telecommunications policy issues in telecommunications regulatory proceedings before some forty state commissions, the Federal Communications Commission and the Canadian Radio-television and Telecommunications Commission, among others. He has appeared as a witness on behalf of commercial organizations, non-profit institutions, as well as local, state and federal government authorities responsible for telecommunications regulation and consumer advocacy.

He has served or is now serving as a consultant to numerous state utilities commissions including those in Arizona, Minnesota, Kansas, Kentucky, the District of Columbia, Connecticut, California, Delaware, Maine, Massachusetts, New Hampshire, Vermont, New Mexico, Wisconsin and Washington State, the Office of Telecommunications Policy (Executive Office of the President), the National Telecommunications and Information Administration, the Federal Communications Commission, the Canadian Radio-television and Telecommunications Commission, the United Kingdom Office of Telecommunications, and the Secretaria de Comunicaciones y Transportes of the Republic of Mexico. He has also served as an advisor on telecommunications regulatory matters to the International Communications Association and the Ad Hoc Telecommunications Users Committee, as well as to a number of major corporate telecommunications users, information services providers, paging and cellular carriers, and specialized access services carriers.

Dr. Selwyn has presented testimony as an invited witness before the U.S. House of Representatives Subcommittee on Telecommunications, Consumer Protection and Finance and before the U.S. Senate Judiciary Committee, on subjects dealing with restructuring and deregulation of portions of the telecommunications industry.

In 1970, he was awarded a Post-Doctoral Research Grant in Public Utility Economics under a program sponsored by the American Telephone and Telegraph Company, to conduct research on the economic effects of telephone rate structures upon the computer time sharing industry. This work was conducted at Harvard University's Program on Technology and Society, where he was appointed as a Research Associate. Dr. Selwyn was also a member of the faculty at the College of Business Administration at Boston University from 1968 until 1973, where he taught courses in economics, finance and management information systems.

Dr. Selwyn has published numerous papers and articles in professional and trade journals on the subject of telecommunications service regulation, cost methodology, rate design and pricing policy. These have included:

"Taxes, Corporate Financial Policy and Return to Investors"
National Tax Journal, Vol. XX, No.4, December 1967.

"Pricing Telephone Terminal Equipment Under Competition"
Public Utilities Fortnightly, December 8, 1977.

"Deregulation, Competition, and Regulatory Responsibility in the Telecommunications Industry"
Presented at the 1979 Rate Symposium on Problems of Regulated Industries - Sponsored by: The American University, Foster Associates, Inc., Missouri Public Service Commission, University of Missouri-Columbia, Kansas City, MO, February 11 - 14, 1979.

"Sifting Out the Economic Costs of Terminal Equipment Services"
Telephone Engineer and Management, October 15, 1979.

"Usage-Sensitive Pricing" (with G. F. Borton)
(a three part series)
Telephony, January 7, 28, February 11, 1980.

"Perspectives on Usage-Sensitive Pricing"
Public Utilities Fortnightly, May 7, 1981.

"Diversification, Deregulation, and Increased Uncertainty in the Public Utility Industries"
Comments Presented at the Thirteenth Annual Conference of the Institute of Public Utilities, Williamsburg, VA - December 14 - 16, 1981.

"Local Telephone Pricing: Is There a Better Way?; The Costs of LMS Exceed its Benefits: a Report on Recent U.S. Experience."

Proceedings of a conference held at Montreal, Quebec - Sponsored by Canadian Radio-Television and Telecommunications Commission and The Centre for the Study of Regulated Industries, McGill University, May 2 - 4, 1984.

"Long-Run Regulation of AT&T: A Key Element of A Competitive Telecommunications Policy"
Telematics, August 1984.

"Is Equal Access an Adequate Justification for Removing Restrictions on BOC Diversification?"
Presented at the Institute of Public Utilities Eighteenth Annual Conference, Williamsburg, VA - December 8 - 10, 1986.

"Market Power and Competition Under an Equal Access Environment"
Presented at the Sixteenth Annual Conference, "Impact of Deregulation and Market Forces on Public Utilities: The Future Role of Regulation"
Institute of Public Utilities, Michigan State University, Williamsburg, VA - December 3 - 5, 1987.

"Contestable Markets: Theory vs. Fact"
Presented at the Conference on Current Issues in Telephone Regulations: Dominance and Cost Allocation in Interexchange Markets - Center for Legal and Regulatory Studies Department of Management Science and Information Systems - Graduate School of Business, University of Texas at Austin, October 5, 1987.

"The Sources and Exercise of Market Power in the Market for Interexchange Telecommunications Services"
Presented at the Nineteenth Annual Conference - "Alternatives to Traditional Regulation: Options for Reform" - Institute of Public Utilities, Michigan State University, Williamsburg, VA, December, 1987.

"Assessing Market Power and Competition in The Telecommunications Industry: Toward an Empirical Foundation for Regulatory Reform"
Federal Communications Law Journal, Vol. 40 Num. 2, April 1988.

"A Perspective on Price Caps as a Substitute for Traditional Revenue Requirements Regulation"
Presented at the Twentieth Annual Conference - "New Regulatory Concepts, Issues and Controversies" - Institute of Public Utilities, Michigan State University, Williamsburg, VA, December, 1988.

"The Sustainability of Competition in Light of New Technologies" (with D. N. Townsend and P. D. Kravtin)
Presented at the Twentieth Annual Conference - Institute of Public Utilities Michigan State University, Williamsburg, VA, December, 1988.

"Adapting Telecom Regulation to Industry Change: Promoting Development Without Compromising Ratepayer Protection" (with S. C. Lundquist)
IEEE Communications Magazine, January, 1989.

"The Role of Cost Based Pricing of Telecommunications Services in the Age of Technology and Competition"
Presented at National Regulatory Research Institute Conference, Seattle, July 20, 1990.

"A Public Good/Private Good Framework for Identifying POTS Objectives for the Public Switched Network" (with Patricia D. Kravtin and Paul S. Keller)
Columbus, Ohio: *National Regulatory Research Institute*, September 1991.

"Telecommunications Regulation and Infrastructure Development: Alternative Models for the Public/Private Partnership"
Prepared for the Economic Symposium of the International Telecommunications Union Europe Telecom '92 Conference, Budapest, Hungary, October 15, 1992.

"Efficient Infrastructure Development and the Local Telephone Company's Role in Competitive Industry Environment" *Presented at the Twenty-Fourth Annual Conference, Institute of Public Utilities, Graduate School of Business, Michigan State University, "Shifting Boundaries between Regulation and Competition in Telecommunications and Energy"*, Williamsburg, VA, December 1992.

"Measurement of Telecommunications Productivity: Methods, Applications and Limitations" (with Françoise M. Clottes)
Presented at Organisation for Economic Cooperation and Development, Working Party on Telecommunication and Information Services Policies, '93 Conference "Defining Performance Indicators for Competitive Telecommunications Markets", Paris, France, February 8-9, 1993.

"Telecommunications Investment and Economic Development: Achieving efficiency and balance among competing public policy and stakeholder interests"
Presented at the 105th Annual Convention and Regulatory Symposium, National Association of Regulatory Utility Commissioners, New York, November 18, 1993.

"The Potential for Competition in the Market for Local Telephone Services" (with David N. Townsend and Paul S. Keller)
Presented at the Organization for Economic Cooperation and Development Workshop on Telecommunication Infrastructure Competition, December 6-7, 1993.

"Market Failure in Open Telecommunications Networks: Defining the new natural monopoly," *Utilities Policy*, Vol. 4, No. 1, January 1994.

The Enduring Local Bottleneck: Monopoly Power and the Local Exchange Carriers, (with Susan M. Gately, et al) a report prepared by ETI and Hatfield Associates, Inc. for AT&T, MCI and CompTel, February 1994.

Commercially Feasible Resale of Local Telecommunications Services: An Essential Step in the Transition to Effective Local Competition, (Susan M. Gately, et al) a report prepared by ETI for AT&T, July 1995.

"Efficient Public Investment in Telecommunications Infrastructure"
Land Economics, Vol 71, No.3, August 1995.

Funding Universal Service: Maximizing Penetration and Efficiency in a Competitive Local Service Environment, Lee L. Selwyn with Susan M. Baldwin, under the direction of Donald Shepheard, A Time Warner Communications Policy White Paper, September 1995.

Stranded Investment and the New Regulatory Bargain, Lee L. Selwyn with Susan M. Baldwin, under the direction of Donald Shepheard, A Time Warner Communications Policy White Paper, September 1995

"Market Failure in Open Telecommunications Networks: Defining the new natural monopoly," in *Networks, Infrastructure, and the New Task for Regulation*, by Werner Sichel and Donal L. Alexander, eds., University of Michigan Press, 1996.

Establishing Effective Local Exchange Competition: A Recommended Approach Based Upon an Analysis of the United States Experience, Lee L. Selwyn, paper prepared for the Canadian Cable Television Association and filed as evidence in Telecom Public Notice CRTC 95-96, Local Interconnection and Network Component, January 26, 1996.

The Cost of Universal Service, A Critical Assessment of the Benchmark Cost Model, Susan M. Baldwin with Lee L. Selwyn, a report prepared by Economics and Technology, Inc. on behalf of the National Cable Television Association and submitted with Comments in FCC Docket No. CC-96-45, April 1996.

Economic Considerations in the Evaluation of Alternative Digital Television Proposals, Lee L. Selwyn (as Economic Consultant), paper prepared for the Computer Industry Coalition on Advanced Television Service, filed with comments in FCC MM Docket No. 87-268, In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, July 11, 1996.

Assessing Incumbent LEC Claims to Special Revenue Recovery Mechanisms: Revenue opportunities, market assessments, and further empirical analysis of the "Gap" between embedded and forward-looking costs, Patricia D. Kravtin and Lee L. Selwyn, In the Matter of Access Charge Reform, in CC Docket No. 96-262, January 29, 1997.

The Use of Forward-Looking Economic Cost Proxy Models, Susan M. Baldwin and Lee L. Selwyn, Economics and Technology, Inc., February 1997.

The Effect of Internet Use On The Nation's Telephone Network, Lee L. Selwyn and Joseph W. Laszlo, a report prepared for the Internet Access Coalition, July 22, 1997.

Regulatory Treatment of ILEC Operations Support Systems Costs, Lee L. Selwyn, Economics and Technology, Inc., September 1997.

The "Connecticut Experience" with Telecommunications Competition: A Case in Getting it Wrong, Lee L. Selwyn, Helen E. Golding and Susan M. Gately, Economics and Technology, Inc., February 1998.

Where Have All The Numbers Gone?: Long-term Area Code Relief Policies and the Need for Short-term Reform, prepared by Economics and Technology, Inc. for the Ad Hoc Telecommunications Users Committee, International Communications Association, March 1998.

Broken Promises: A Review of Bell Atlantic-Pennsylvania's Performance Under Chapter 30, Lee L. Selwyn, Sonia N. Jorge and Patricia D. Kravtin, Economics and Technology, Inc., June 1998.

Building A Broadband America: The Competitive Keys to the Future of the Internet, Lee L. Selwyn, Patricia D. Kravtin and Scott A. Coleman, a report prepared for the Competitive Broadband Coalition, May 1999.

Bringing Broadband to Rural America: Investment and Innovation In the Wake of the Telecom Act, Lee L. Selwyn, Scott C. Lundquist and Scott A. Coleman, a report prepared for the Competitive Broadband Coalition, September 1999.

Dr. Selwyn has been an invited speaker at numerous seminars and conferences on telecommunications regulation and policy, including meetings and workshops sponsored by the National Telecommunications and Information Administration, the National Association of Regulatory Utility Commissioners, the U.S. General Services Administration, the Institute of Public Utilities at Michigan State University, the National Regulatory Research Institute at Ohio State University, the Harvard University Program on Information Resources Policy, the Columbia University Institute for Tele-Information, the International Communications Association, the Tele-Communications Association, the Western Conference of Public Service Commissioners, at the New England, Mid-America, Southern and Western regional PUC/PSC conferences, as well as at numerous conferences and workshops sponsored by individual regulatory agencies.

Attachment 2

"The Triumph of the Light"

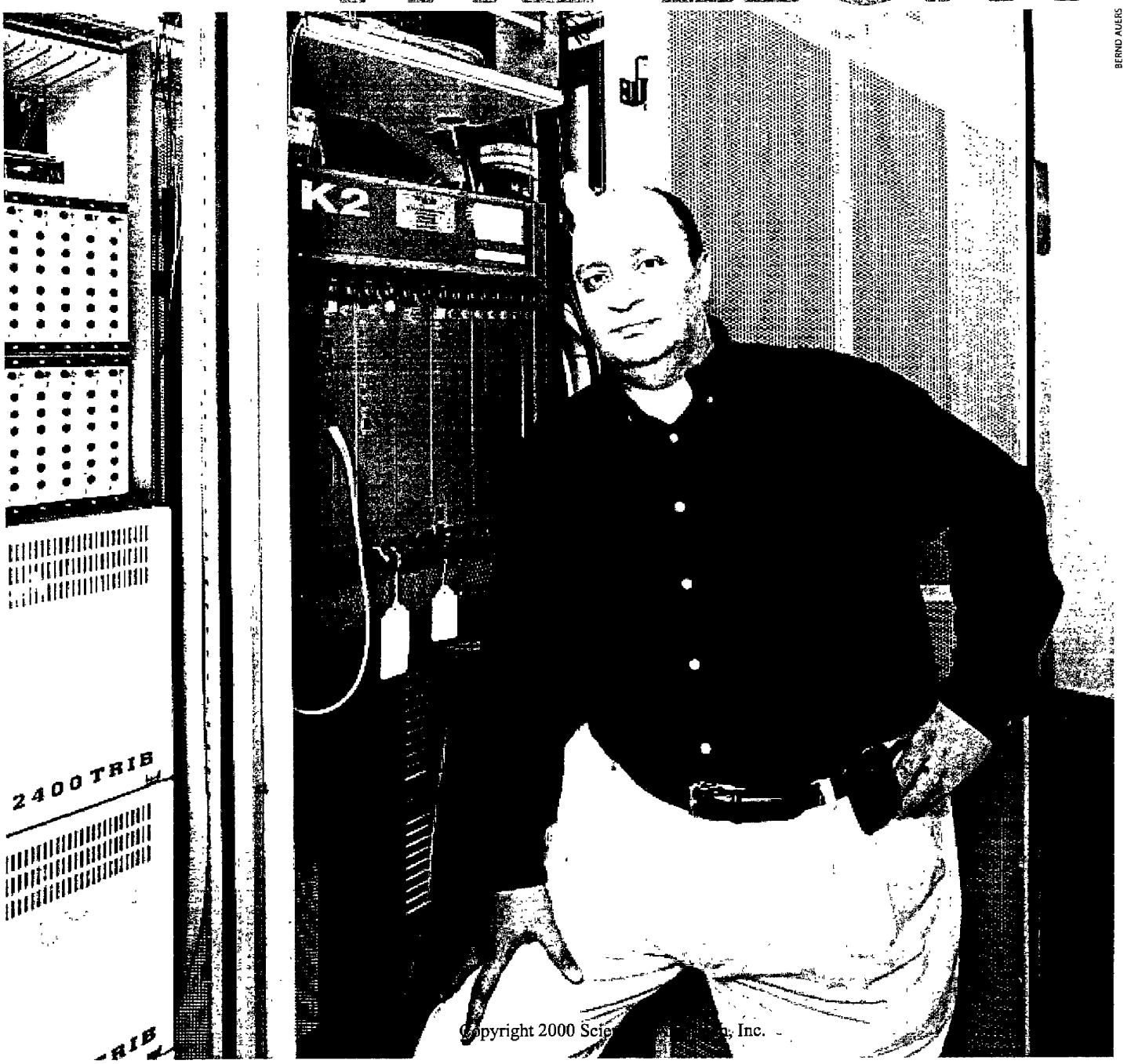
Scientific American

January 2001

Extensions to fiber optics will supply network capacity that borders on the infinite

by Gary Stix, *staff writer*

THE TRIUMPH OF THE LIGHT



BERND AUERS

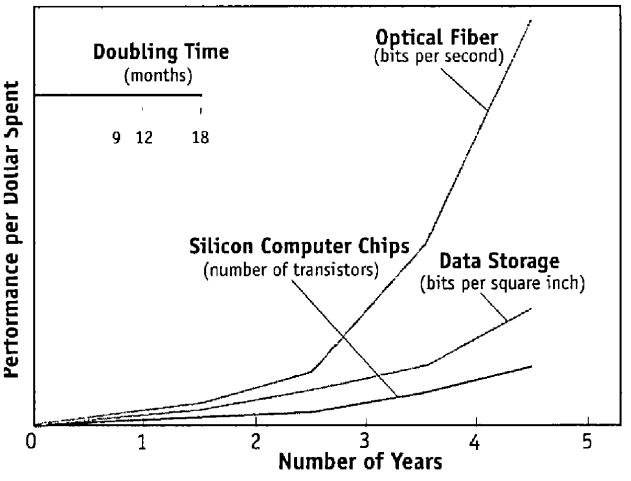
Was it Britney Spears or Fatboy Slim? The network administrators at Kent State University had not a clue. All they did know last February was that "Rockafeller Skank" and thousands of other downloading hits had gotten intermingled with e-mails from the provost and research data on genetic engineering of *E. coli* bacteria. The university network slowed to a crawl, triggering a decision to block access to Napster, the music file-sharing utility.

As demand for network capacity soars, the Napster craze may mark the opening of only the first of many floodgates. Venture capitalists, in fact, have wagered billions of dollars on technologies that may help telecommunications companies counter the prospect that a video Napster capable of downloading anything from *Birth of a Nation* to *Rocky IV* might bring down the entire Internet.

PowerPoint slides at industry conferences emphasize why the deluge is yet to come. Video Napster is just one hypothesis. A trillion bits a second—the average traffic on the Internet's backbones, its heaviest links—may fulfill less than a thousandth of future requirements. Online virtual reality could overwhelm the backbones with up to 10 petabits a second, 10,000 times more than today's traffic. (A petabit is a quadrillion bits, a one with 15 trailing zeros.) Computers that share one another's computing power across the network—what is called metacomputing—might require 200 petabits.

If these scenarios materialize—and, to be sure, people have been tapping their feet for virtual reality for more than a decade—the only transmission medium that could come close to meeting the seemingly infinite demand is optical fiber, the light pipes trumpeted in commercial interludes about the "pin drop" clarity of a phone connection. Fiber links can channel hundreds of thousands of times the bandwidth of microwave transmitters or satellites, the nearest competitors for long-distance communications. As one wag pointed out, the only other technology that comes close to matching this delivery capacity is a panel truck full of videos.

The race to augment the fiber content of the world's networks has started. Every day installers lay enough new cable to circle the earth three times. If improvements in fiber optics continue, the carrying capacity of a single fiber may reach hundreds of trillions of bits a second just a decade or so from now—and some technoidal utopians foresee the eventual arrival of the vaunted petabit mark. To overcome that barrier, however, will require both fundamental breakthroughs and the deployment of technologies that are still more physics experiments than they are equipment ready to be slotted into the racks on nationwide phone and data networks.



FIBER LEADS in performance improvements. The number of bits a second (a measure of fiber performance) doubles every nine months for every dollar spent on the technology. In contrast, the doubling time for the number of transistors on a computer chip occurs every 18 months—a trend known as Moore's law. Over a five-year period, optical technology far outpaces silicon chips and data storage.

More immediately, new photonic technologies, which literally use mirrors instead of electrons for rerouting signals, will make a whole class of electronic switching systems obsolete. Even now the transmission speeds of the most advanced networks—at 10 billion bits a second—threaten to choke the processing units and memory of microchips in existing switches. As the network becomes faster than the processor, the cost of using electronics with optical transmissions skyrockets. The gigabit torrent contained in a wavelength of light in the fiber must be broken up into slower-flowing data streams that can be converted to electrons for processing—and then reaggregated into a fast-flowing river of bits. The equipment for going from photon to electron and back to photon not only slows traffic on the superhighway but makes equipment costs soar.

While network designers contemplate the prospect of machine overload, hundreds of companies, big and small, now grapple with creating networks that can exploit fiber's full bandwidth by transmitting, combining, amplifying and switching wavelengths without ever converting the signal to electrons. Photonics is at a stage that electronics experienced 30 years ago—with the development and integration of component parts into larger systems and subsystems. A rising tide of venture capital has emerged to support these endeavors. In the first nine months of 2000, venture funding for optical networking totaled $3.4 billion, com-

WAVELENGTH carrying 40 billion bits per second flows through this yellow fiber, provided by start-up Enkido, founded by Nayel Shafei.

pared with $1.5 billion for all of 1999, although this pace may have slowed in recent months. The success of a stock like component supplier JDS Uniphase stems in part from the perception that its edge in integrated photonics could make it the next Intel.

Investment in optical communications already yields payoffs, if fiber optics is matched against conventional electronics. The cost of transmitting a bit of information optically halves every nine months, as against 18 months to achieve the same cost reduction for an integrated circuit (the latter metric is famous as Moore's law). "Because of dramatic advances in the capacity and ubiquity of fiber-optic systems and subsystems, bandwidth will become too cheap to meter," predicts A. Arun Netravali, president of Lucent Technologies's Bell Laboratories in a recent issue of *Bell Labs Technical Journal*.

Identical forecasts about a free resource eventually came to haunt the nuclear power industry. And the future of broadband networking, in which a full-length feature film would be transmitted as readily as an e-mail message, is still not a sure bet. A decade ago telecommunications providers and media companies started preparing for the digital convergence of entertainment and networking. Five hundred channels. Video on demand. We're still waiting. Meanwhile the Internet, once viewed as a quaint techno sideshow for the government and schoolkids, has transmuted into the network that ate the world. E-mails and Web sites have triumphed over Mel Gibson and Cary Grant.

And Then There Was Light

Prospects of limitless bandwidth—the basis for speculations about networked virtual reality and high-definition videos—are of relatively recent vintage. AT&T and GTE deployed the first optical fibers in the commercial communications network in 1977, during the heyday of the minicomputer and the infancy of the personal computer. A fiber consists of a glass core and a surrounding layer called the cladding. The core and cladding have carefully chosen indices of refraction (a measure of the material's ability to bend light by certain amounts) to ensure that the photons propagating in the core are always reflected at the interface of the cladding. The only way the light can enter and escape is through the ends of the fiber. To understand the physics behind how a fiber works, imagine looking into a still pool of water. If you look straight down, you see the bottom. At viewing angles close to the water, all that is perceived is reflected light. A transmitter—either a light-emitting diode or a laser—sends electronic data that have been converted to photons over the fiber at a wavelength of between 1,200 and 1,600 nanometers.

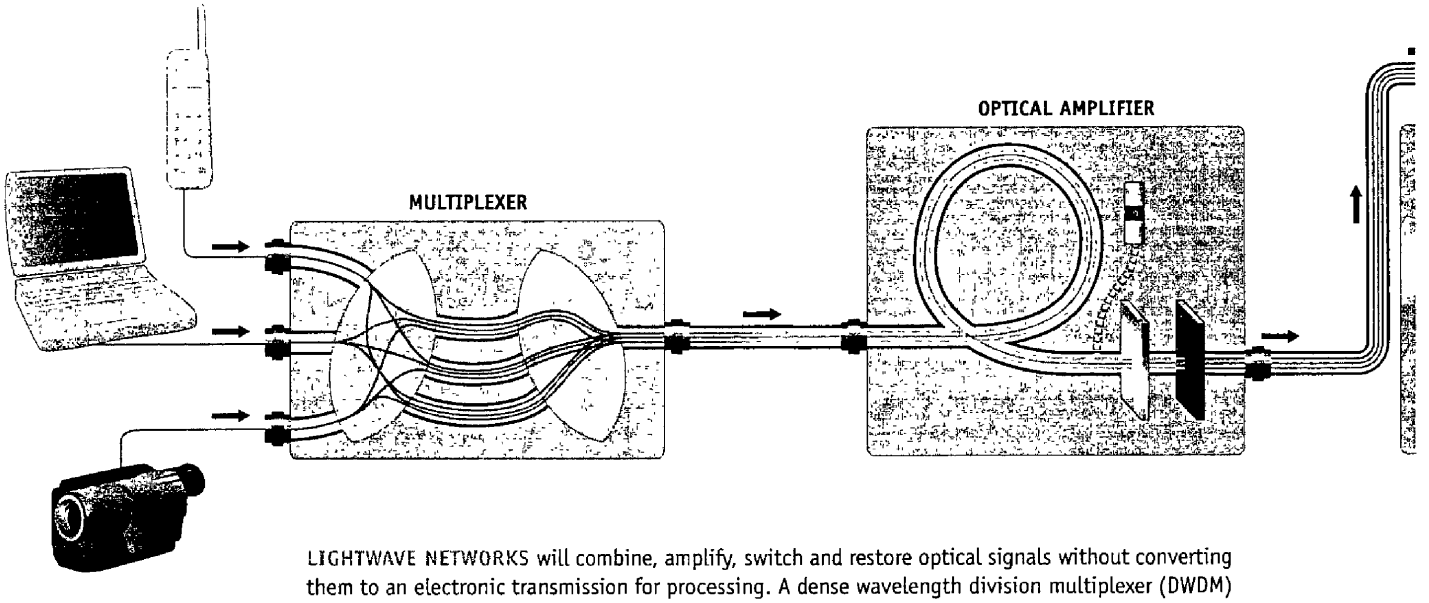
Today some fibers are pure enough that a light signal can travel for about 80 kilometers without the need for amplification. But at some point the signal still needs to be boosted. The next significant step on the road to the all-optical network came in the early 1990s, a time when the technology made astounding advances. It was then that electronics for amplifying signals were replaced by stretches of fiber infused with ions of the rare-earth element erbium. When these erbium-doped fibers were zapped by a pump laser, the excited ions could revive a fading signal. The amplifiers became much more than plumbing fixtures for light pipes. They restore a signal without any optical-to-electronic conversion and can do so for very high speed signals sending tens of gigabits a second. Perhaps most important, however, they can boost the power of many wavelengths simultaneously.

This ability to channel multiple wavelengths enabled the development of a technology that has helped drive the frenzy of activity for optical-networking companies in the financial markets. Once you can boost the strength of multiple wavelengths, the next thing you want to do is jam as many wavelengths as possible down a fiber, with a wavelength carrying as much data as possible. The technology that does this has a name—dense wavelength division multiplexing (DWDM)—that is a paragon of technospeak.

DWDM set off a bandwidth explo-

LAURIE GRACE

Technologies for All-Optical Networks



LIGHTWAVE NETWORKS will combine, amplify, switch and restore optical signals without converting them to an electronic transmission for processing. A dense wavelength division multiplexer (DWDM) will take different wavelengths of light and place them on a single fiber connection. An optical ampli-

sion. With the multiplexing technology, the capacity of the fiber expands by the number of wavelengths, each of which can carry more data than could be handled previously by a single fiber. Nowadays it is possible to send 160 frequencies simultaneously, supplying a total bandwidth of 400 gigabits a second over a fiber. Every major telecommunications carrier has deployed DWDM, expanding the capacity of the fiber that is in the ground and spending what could be less than half of what it would cost to lay new cable, while the equipment gets installed in a fraction of the time it takes to dig a hole.

In the laboratory, meanwhile, experiments point toward using much of the capacity of fiber—dozens of individual wavelengths, each modulated at 40 gigabits or more a second, for effective transmission rate of a few terabits a second. (One company, Enkido, has already deployed commercial links containing 40-gigabit-a-second wavelengths.) The engorgement of fiber capacity will not stop anytime soon and could reach as high as 300 or 400 terabits a second—and, with new technical advances, perhaps exceed the petabit barrier.

The telecommunications network, however, does not consist of links that tie together point A and point B—switches are needed to route the digital flow to its ultimate destination. The enormous bit conduits that now populate laboratory testbeds will flounder if the light streams are routed using conventional electronic switches. Doing so would require a multiterabit signal to be converted into dozens or hundreds of lower-speed electronic signals. Finally, switched signals would have to be reconverted to photons and reaggregated into light channels that are then sent out through a designated output fiber.

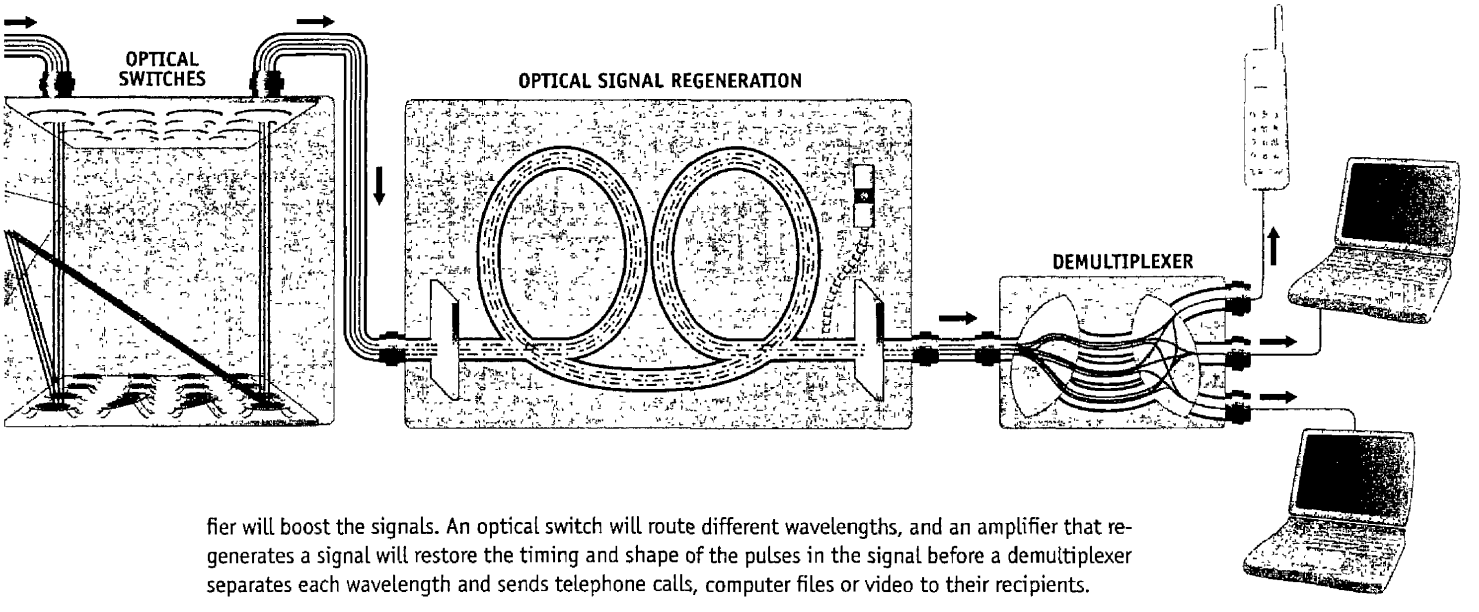
The cost and complexity of electronic switching have prompted a mad scramble to find a means of redirecting either individual wavelengths or the entire light signal in a fiber from one pathway to another without the optoelectronic conversion. Research teams, often inhabiting tiny start-ups, fiddle with microscopic mirrors, liquid crystals and fast lasers to try to devise all-optical switches [see "The Rise of Optical Switching," on page 88].

All-optical switching, however, will differ in fundamental ways from existing networks that switch individual chunks of data bits, such as IP (Internet Protocol) packets. It is an easy task for the electronics in routers or large-scale telephone switches to read on a packet the address that denotes its destination. Photonic processors, which are at about the same stage of development that electronics was in the 1960s, have demonstrated the ability to read a packet only in laboratory experiments.

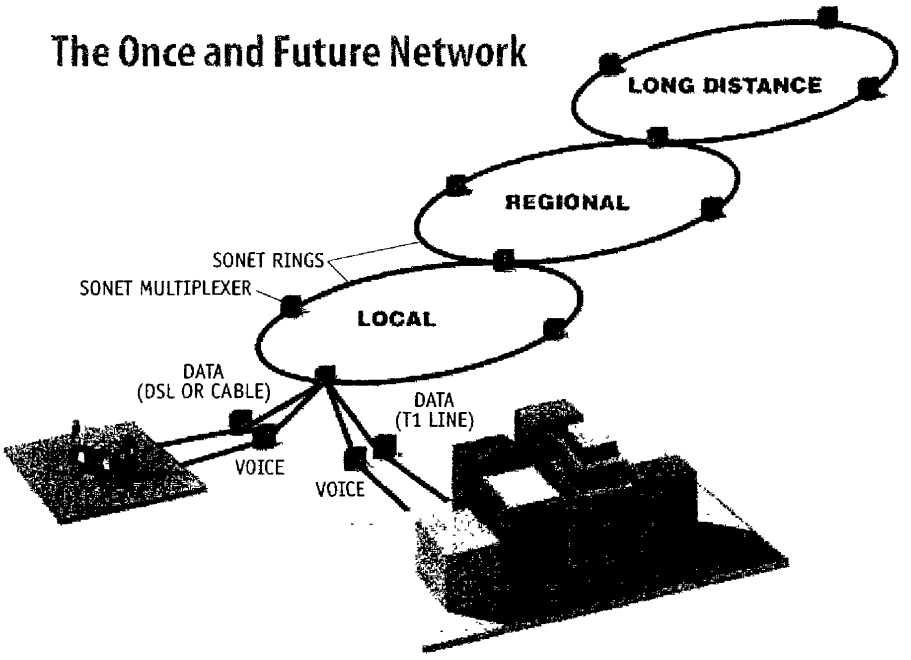
Optical switches heading to the marketplace hark back to earlier generations of electronic equipment. They will switch a circuit—a wavelength or an entire fiber—from one pathway to another, leaving the data-carrying packets in a signal untouched. An electronic signal will set the switch in the right position so that it directs an incoming fiber—or wavelengths within that fiber—to a given output fiber. But none of the wavelengths will be converted to electrons for processing.

Optical circuit switching may be only an interim step, however. As networks get faster, communications companies may demand what could become the crowning touch for all-optical networking, the switching of individual packets using optical processors [see "Routing Packets with Light," on page 96].

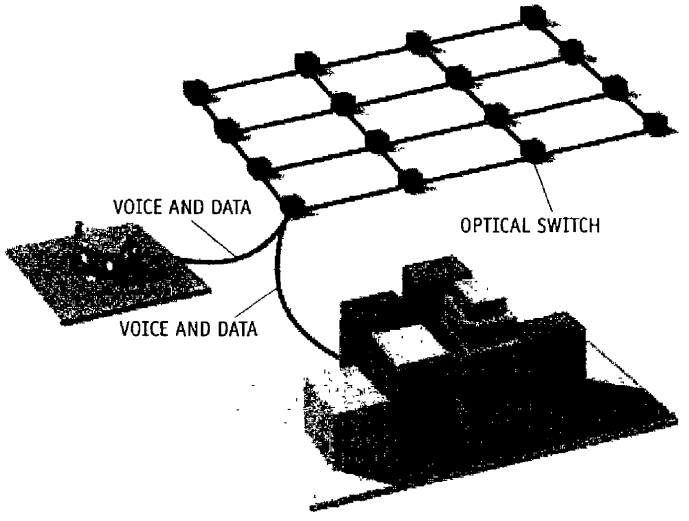
With the advent of optical packet switching, individual packets will still need to get read and routed at the edges of optical networks—on local phone networks near the points where they are sent or received. For the moment, that task will still fall to electronic routers from companies such as Cisco Systems. Even so, the evolution of optical networking will promote changes in the way networks are designed. Optical switching may eventually make obsolete existing lightwave technologies based on the ubiquitous SONET (Synchronous Optical Network) communications standard, which relies on electronics for conversion and processing of individual packets. And this may proceed in tandem with the gradual withering away of Asynchronous Transfer Mode



fier will boost the signals. An optical switch will route different wavelengths, and an amplifier that regenerates a signal will restore the timing and shape of the pulses in the signal before a demultiplexer separates each wavelength and sends telephone calls, computer files or video to their recipients.



TODAY'S ADVANCED NETWORKS maintain mostly separate electronic connections for voice and data and achieve reliability using rings based on the Synchronous Optical Network (SONET) communications standard: if one link is cut, traffic flows down the other half of the ring. The SONET multiplexer aggregates traffic onto the ring.



TOMORROW'S NETWORKS will channel all traffic over the same fiber connection and will provide redundancy using the Internet's mesh of interlocking pathways: when a line breaks, traffic can flow down several alternating pathways. Optical switching will become the foundation for building these integrated networks.

(ATM), another phone company standard for packaging information.

In this new world, any type of traffic, whether voice, video or data, may travel as IP packets. A development heralded in telecommunications for at least 20 years—the full integration of voice, video and data services—will be complete. "It's going to be a data network, and everything else, whether it's voice or video, will be applications traveling over that data network," says Robert W. Lucky, a longtime observer of the telecommunications scene and director of research for the technology development firm Telcordia.

When you ring home on Mother's Day, the call may get transmitted as IP packets that move on a Gigabit Ethernet, a made-for-the-superhighway version of the ubiquitous local-area network (LAN). Gigabit Ethernet would in turn ride on wavelength-multiplexed fiber. Critics of this approach question whether such a network would provide ATM and SONET's quality of service and their ability to reroute connections automatically when a fiber link is cut.

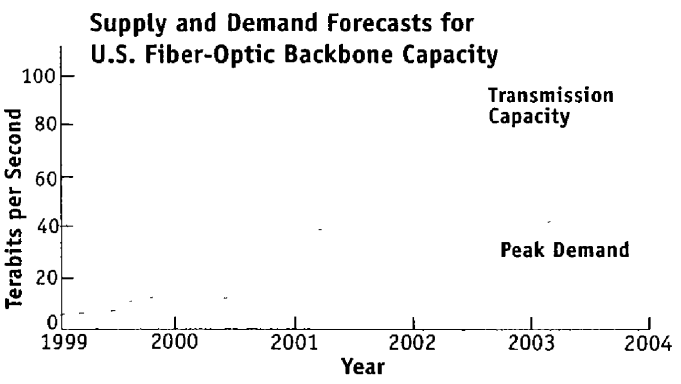
Life would be simpler, though. The phone network would become just one big LAN. You could simply slot an Ethernet card into a computer, telephone or television, a far cheaper and less time-consuming solution than installing new SONET hardware connections. Some companies are even now preparing for the day when IP reigns. Level 3 Communications, a carrier based in Denver, has laid an international fiber network stretching more than 20,000 miles in both the U.S. and overseas. Although the network still relies on SONET, CEO James Q. Crowe foresees a day when these costly legacies of the voice network will wither into nothingness. "It will be IP over Ethernet over optics," Crowe says.

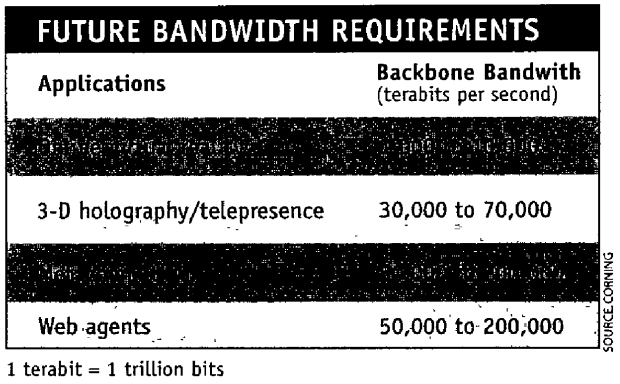
Home Light Pipes

Even if network engineers can pare down the stack of protocols that weighs heavy on today's network, they must still contend with the need to address the "last mile" problem, getting fiber from the curbside utility box into the TV room and home office. Some builders now lay out new housing projects with fiber, presaging the day when households routinely get their own wavelength connection. But cost still hangs over any discussion of fiber to the home. Until recently, advanced optical-networking equipment, such as DWDM, was too expensive to consider for deployment on regional phone networks. Extending the equipment into a wall panel of a split level—at perhaps $1,500 a line—still costs more than all but a few are willing to pay. Most people have yet to take delivery of their first megabit connection. So it remains unclear when the time will come when the average household will need the gigabits to project themselves holographically into a neighbor's house rather than just picking up the phone.

Dousing "Help me, Obi-Wan Kenobi" fantasies, engineers are confronting an array of nettlesome technical problems before a seamless all-optical network can become commonplace. Take one example: even with lightwave switching in

LAURIE GRACE





DEMAND GAP for optical-fiber backbones—the most heavily used links—emerges in a study by consultant Adventis that shows that supply will overmatch demand. Yet new applications such as virtual reality and metacomputing could require huge increments in optical bandwidth above the few terabits per second currently needed to satisfy demand on U.S. communications backbones.

place, one critical part of the network requires conversion to electronics. About every 160 kilometers, a wavelength has to be converted back to an electronic signal to restore the shape and timing of individual pulses within the vast train of bits that occupy each lightwave.

Equipment suppliers also struggle mightily with electronics envy. Component suppliers such as JDS Uniphase labor on methods to build modules that combine lasers, fiber and gratings (which separate wavelengths). Building photonic integrated circuits remains difficult. Photons have no charge, as the negatively charged particles called electrons do. So there is no such thing as a charge-storage device, a photonic capacitor, that will store indefinitely the photons that represent zeros and ones. Moreover, it is difficult to build photonic circuitry as small as electronic integrated circuits, because the wavelength of infrared light used in fiber-optic lasers is about 1.5 microns, which places limits on how small you can make a component. Electronic circuits reached that dimension more than a decade ago.

The good news is that companies both small and big are now trying to solve problems such as signal restoration, and a pot of venture money exists to fund them. The field, which has taken on the same aura that genomics now holds and dot-coms once did, has become an exemplar of a new, hyperventilating model of research. Tiny development houses proceed until they can furnish some proof that they can make good on their promises, and then they are bought out by a Nortel, Cisco or Lucent.

"It's a crazy world," says Alastair M. Glass, director of photonics at Lucent. "Anyone can go out with the dumbest ideas and get funding for them, and maybe they'll be bought for big bucks. And they've never made a product." Glass adds: "This has never happened in the past. Part of it is because companies need people, so they're buying the people. But other times they're buying the technology because they don't have it in the house, and sometimes they don't know what they're buying." From idea to development happens fast: a 1998 paper in *Science* about a "perfect mirror," a dielectric (insulating) material that reflects light at any angle with little loss of energy, inspired the founding of a company that wishes to create a hollow fiber whose circumference is lined with the reflector. The fibers may increase capacity 1,000-fold, one company official claims.

Will Anybody Come?

What can be done with all this bandwidth? Lucent estimates that if the growth of networks continues at its current pace, the world will have enough digital capacity by 2010 to give every man, woman and child, whether in San Jose or Sri Lanka, a 100-megabit-a-second connection. That's enough for dozens of video connections or several high-definition television programs. But does each !Kung tribesman in the Kalahari Desert really need to download multiple copies of *The Gods Must Be Crazy*?

Despite estimates of Internet traffic doubling every few months, some industry watchers are not so sure about infinite demand for infinite bandwidth. Adventis, a Boston-based consultancy, foresees only 15 to 20 percent of home Internet users obtaining broadband access—either cable modems or digital subscriber lines—by 2004. Moreover, storing frequently accessed Web pages on a server will reduce the burden on the network. In the U.S., according to the firm's estimate, nearly 40 percent of existing fiber capacity will go unused in 2004, whereas in Europe almost 65 percent will stay dormant. The notion of a capacity glut is by no means a consensus view, however.

In the end, terabit or petabit networking will probably emerge only once some as yet unforeseen use for the bandwidth reveals itself. Like the World Wide Web, originally a project to help particle physicists more easily share information, it may arrive on a tangent, not from a big media company's focused attempt to repackage networked virtual reality. Vinod Khosla, a venture capitalist with Kleiner Perkins Caufield & Byers, talks of the promise of projects that pool together computers that may be either side by side or distributed across the globe. Metacomputing can download Britney Spears and Fatboy Slim, or it can comb through radio telescope data in search of extraterrestrial life. Khosla sees immense benefit in using this model of networked computing for business, tying together machines to work on, say, the computational fluid dynamics of a 1,000-passenger jumbo jet.

So efforts to pick through the radio emissions from billions and billions of galaxies may yield useful clues about what on earth to do with a network pulsing a quadrillion bits a second.

CLEO VILETT

Further Information

See www.lightreading.com for a wealth of coverage on new technologies and on companies involved in optical networking.

Attachment 3

Workpapers Supporting Transport Distance and Cost Calculations

Table 1

Alltel Florida
Weighted Average Transport Distance For Lake Butler Local Calling Area

Exchange	CLLI Code	Coordinates V (Orig)	Coordinates H (Orig)	Distance (Miles)	Switched Lines	Percentage of Lines	Weighted Distance
Alachua	ALACHUA	07830	01353	18.66	6,144	59.17%	11.04
Lake Butler	LAKEBUTLER	07771	01352	0.00	3,806	36.65%	0.00
Raiford	RAIFORD	07750	01337	8.16	434	4.18%	0.34
					10,384	**100%**	**11.38**

Total Average Weighted Distance **11.38**

Assumed location of GNAPS CLEC Switch/POI

Lake Butler V & H	07771	01352

Source: Local Exchange Routing Guide (LERG) January 2002, FCC's Hybrid Cost Proxy Model (HCPM)

Table 2

Alltel Florida
Weighted Average LATA-Wide Transport Distance From Lake Butler (LKBTFLXA)

Exchange	CLLI Code	Coordinates V (Orig)	Coordinates H (Orig)	Distance (Miles)	Switched Lines	Percentage of Lines	Weighted Distance
Alachua	ALACHUA	07830	01353	18.66	6,144	9.95%	1.86
Florida Sheriffs Boys	FLSHSBYRNH	07762	01506	48.78	676	1.09%	0.53
Branford	BRANFORD	07838	01441	35.23	2,360	3.82%	1.35
Callahan	CLHNFLXA	07620	01329	48.30	5,985	9.69%	4.68
Crescent City	CRCYFLXA	07801	01152	63.95	3,664	5.93%	3.79
Dowling Park	DOWLING PK	07814	01524	56.07	1,614	2.61%	1.46
Florahome	FLRHFLXA	07782	01246	33.70	780	1.26%	0.43
Fort White	FORT WHITE	07826	01402	23.51	1,587	2.57%	0.60
High Springs	HIGH SPG	07833	01374	20.80	5,020	8.13%	1.69
Hilliard	HLRDFLXA	07605	01357	52.52	2,855	4.62%	2.43
Hastings	HSNGFLXA	07747	01183	53.98	1,693	2.74%	1.48
Interlachen	INTRFLXA	07802	01235	38.28	4,694	7.60%	2.91
Jennings	JENNINGS	07735	01539	60.22	1,122	1.82%	1.09
Jasper	JASPER	07737	01506	49.87	2,523	4.08%	2.04
Lake Butler	LAKEBUTLER	07771	01352	0.00	3,806	6.16%	0.00
Luraville	LURAVILLE	07814	01498	48.13	1,254	2.03%	0.98
Live Oak	LIVE OAK	07782	01487	42.83	11,160	18.07%	7.74
Mayo	MAYO	07846	01493	50.50	1,915	3.10%	1.57
Raiford	RAIFORD	07750	01337	8.16	434	0.70%	0.06
White Springs	WHITE SPG	07754	01454	32.70	703	1.14%	0.37
Wellborn	WELLBORN	07778	01454	32.33	1,789	2.90%	0.94
					61,776	**100%**	**37.98**
				Total Average Weighted Distance			**37.98**

Assumed location of GNAPS CLEC Switch/POI

Lake Butler V & H	07771	01352

Source: Local Exchange Routing Guide (LERG) January 2002, FCC's Hybrid Cost Proxy Model (HCPM)

Table 3

Alltel Florida

Incremental Cost of Transport Beyond Alltel Local Calling Area
CLEC Switch/POI Location in Lake Butler-- Using Alltel's DS3 Rate

Weighted average transport distance within Local Calling Area		11.38 miles
Weighted average transport distance within entire Alltel Jacksonville LATA		37.98 miles
Incremental transport distance for LATA-wide origination/termination from single point of interconnection (SPOI) in Lake Butler		**26.6** miles
DS3 SWA rate per mile per Alltel Florida Intrastate Access tariff	$	175.00
DS3 minutes per month		8,900,000
DS3 SWA rate per minute per mile	$	0.00001966
Incremental cost of transport for LATA-wide origination/termination	**$**	**0.00052303**

Source: Alltel Florida Inc. Access Service Tariff, section 16.4 C.2 (3) (b), Effective October 1, 1996; Georgia PSC Docket No. 13542-U, Direct Testimony of Cynthia K. Cox (BellSouth), April 3, 2001, at page 11 (for DS3 minutes per month).

Table 4

Alltel Florida

Incremental cost of transport beyond Alltel local calling area
CLEC switch/POI location in Lake Butler-- SBC/SWB Texas DS3 Rate

Weighted average transport distance within Local Calling Area		11.38 miles
Weighted average transport distance within entire Alltel Jacksonville LATA		37.98 miles
Incremental transport distance for LATA-wide origination/termination from single point of interconnection (SPOI) in Lake Butler		**26.6** miles
DS3 UNE rate per mile per SBC/SWB - TX tariff (suburban IO transport rate)	$	16.16
DS3 minutes per month		8,900,000
DS3 UNE rate per minute per mile	$	0.000001816
Incremental cost of transport for LATA-wide origination/termination	**$**	**0.000048298**

Source: SBC/SWB-Texas, Texas T2A Agreement, Revised January 31, 2000, Appendix Pricing -- UNE Schedule of Prices, April 16, 2001; Georgia PSC Docket 13542-U, Direct Testimony of Cynthia K. Cox (BellSouth), April 3, 2001, at page 11 (for DS3 minutes per month).

Table 5

Alltel Florida

Incremental cost of transport beyond Alltel local calling area
CLEC switch/POI location in Lake Butler-- BellSouth Georgia DS3 Rate

Weighted average transport distance within Local Calling Area		11.38 miles
Weighted average transport distance within entire Alltel Jacksonville LATA		37 98 miles
Incremental transport distance for LATA-wide origination/termination from single point of interconnection (SPOI) in Lake Butler		**26.6** miles
DS3 UNE rate per mile per BellSouth-GA Interim UNE rate (Docket 11853-U)	$	2.72
DS3 minutes per month		8,900,000
DS3 UNE rate per minute per mile	$	0.0000003056
Incremental cost of transport for LATA-wide origination/termination	**$**	**0.0000081294**

Source: Georgia PSC Dkt. 11853-U, ref. Dkt. 10692, Doc. No. 47662 (6/4/01), BellSouth-GA Revised Statement of Generally Available Terms and Conditions for Interconnection, Unbundling and Resale, May 31, 2001, Georgia SGAT, Attachment A; and Georgia PSC Docket 13542-U, Direct Testimony of Cynthia K. Cox (BellSouth), April 3, 2001, at page 11 (for DS3 minutes per month).

Attachment 4

Efficient Intercarrier Compensation Mechanisms for the Emerging Competitive Environment

Lee L. Selwyn and Scott C. Lundquist (August 2001)

EFFICIENT INTERCARRIER COMPENSATION MECHANISMS FOR THE EMERGING COMPETITIVE ENVIRONMENT

Lee L. Selwyn
Scott C. Lundquist

August 2001

ECONOMICS AND TECHNOLOGY, INC.
TWO CENTER PLAZA • BOSTON, MASSACHUSETTS 02108

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Preface

EFFICIENT INTERCARRIER COMPENSATION MECHANISMS FOR THE EMERGING COMPETITIVE ENVIRONMENT

When the *Telecommunications Act of 1996* opened the nation's local exchange markets to competition as a legal matter, one of the key implementation challenges was to devise fair and efficient financial arrangements between interconnecting incumbent local exchange carriers (ILECs) and the new competitive LECs (CLECs). The "reciprocal compensation" payments system that was implemented has become increasingly controversial, as some CLECs have pursued niche markets, notably the market for Internet Service Providers and other users with high volumes of inward calling. In December 2000, the FCC's Office of Plans and Policy (OPP) released two working papers by FCC economists that attempt to provide a theoretical foundation to replace the reciprocal compensation system with a so-called "bill-and-keep" regime, in which each LEC would assume responsibility for the costs of terminating calls to its end users. In April 2001, the FCC adopted an Order that carved out ISP-bound calls from other forms of locally-rated calling for intercarrier compensation purposes, and adopted an accompanying *Notice of Proposed Rulemaking* that seeks to impose bill-and-keep arrangements upon those calls and possibly for other types of exchanged traffic as well.

Economics and Technology, Inc. has been asked by Pac-West Telecomm, Inc., Focal Communications Corporation, and US LEC Corp. to undertake a comprehensive examination of the reciprocal compensation issue and, in particular, the recently published "bill-and-keep" proposals advanced by the FCC's Office of Plans and Policy. The project was conducted under the overall direction of Dr. Lee L. Selwyn and Scott C. Lundquist. Contributing to this work were Anne M. Dupree and Jillian P. Jewett. The views expressed in this study are those of ETI, and do not necessarily reflect the views of its sponsors.

August 2001

Economics and Technology, Inc.
Boston, Massachusetts 02108 USA

Executive Summary

EFFICIENT INTERCARRIER COMPENSATION MECHANISMS FOR THE EMERGING COMPETITIVE ENVIRONMENT

Background

Interconnection refers to the ability to interchange traffic among multiple telecommunications networks, so that from the end user's point of view, there is only one seamless, national "public" telecommunications network connecting all users. While interconnection has long been in place for the franchised monopoly local telephone companies that serve non-overlapping areas, the extension of interconnection arrangements to new market entrants, the competitive local exchange carriers (CLECs), has been a crucial element in their ability to compete. The FCC's August, 1996 *Local Competition Order* established a system of explicit reciprocal compensation between incumbent LECs (ILECs) and CLECs, with charges determined on the basis of ILEC costs, and applied symmetrically to locally-rated traffic exchanged in either direction.

In April 2001, the FCC took two actions with major implications for the financial relationships between interconnected carriers (referred to as "intercarrier compensation" arrangements). On April 18, the FCC issued an order on remand that established a new regime for the intercarrier compensation applicable to so-called "ISP-bound traffic," i.e., dial-up calls made to an Internet Service Provider (ISP). In the companion *Notice of Proposed Rulemaking* (NPRM) adopted on April 19, 2001, the FCC has expressed a strong interest in mechanisms characterized as "bill-and-keep." Under the bill-and-keep model, interconnecting LECs would compensate each other "in kind" by agreeing to terminate each other's calls without explicit charge or, where traffic is out-of-balance, each carrier would look to its own end user customers, rather than to each other, for compensation. The NPRM tentatively concludes that bill-and-keep should be adopted for ISP-bound traffic, seeks comment on whether it should also apply to ordinary locally-rated calls, and expresses an interest in "identifying a unified approach to intercarrier compensation" that could apply to all types of carriers connecting to the local telephone network. The NPRM takes notice of two recent working papers prepared by economists of the FCC's Office of Plans and

Policy (OPP), each of which purports to supply economic justification for their preferred variations of a bill-and-keep system.

Purpose

This report seeks to examine the economic and policy bases for intercarrier compensation arrangements between interconnecting LECs, particularly in the context of the emerging competitive environment established by the *Telecommunications Act of 1996*. We begin by considering the purpose of intercarrier compensation, and define several core principles that should govern the model applicable for the exchange of local telecommunications traffic. We then review how LEC intercarrier compensation issues have been negotiated and resolved in the first five years following adoption of the *Act*, so as to understand the problems faced by the FCC and other regulators today, which in part have led to the FCC's current re-examination of this issue. In that context, we analyze the two OPP working papers in some depth, and also consider additional compensation mechanisms that have been proposed for LEC interconnection, particularly for ISP-bound traffic.

Analytical Framework

After reviewing the role that intercarrier compensation plays in the creation of a competitive multi-carrier environment, we have determined certain core principles that should govern the establishment of intercarrier compensation arrangements for the exchange of local traffic. The compensation arrangement should:

(1) Stimulate efficient economic decisions by entrants, encouraging them to compete with incumbents in those areas where they are or can be more efficient than the incumbent LEC.

(2) Be competitively neutral, conferring no special benefit or exacting any specific disadvantage upon any party merely by virtue of its incumbency, network architecture, scale or scope.

(3) Expressly recognize the potential for market diversity, innovation, and experimentation, and as such should not embrace, reflect, or impose any predisposition as to any one particular market outcome (such as one in which balanced originating/terminating traffic for each CLEC is achieved) or that would penalize any party for deviating from, or failing to achieve, that result.

(4) Be comprehensive and consistent across all network functions having substantially similar economic and technical characteristics and costs.

(5) To the extent possible, accommodate and harmonize with preexisting retail market pricing practices and, to the extent that the compensation arrangement cannot be conformed to such practices, it should only be implemented if this can occur concurrently with a comprehensive revision of retail pricing embracing all services and all jurisdictions.

(6) Be relatively simple and straightforward and should be capable of being implemented, maintained and administered efficiently and with a minimum of transaction-related costs.

(7) Be transparent to the end user, creating no differentiation in retail end user pricing of services based upon whether the end-to-end call is completed by one or by more than one carrier.

(8) Be maintained in place on an essentially permanent basis, subject only to minor "technical corrections" whose purpose is primarily ministerial in nature.

Principal Findings

Our principal findings are as follows:

- The perceived "problems" with the existing intercarrier compensation mechanism of explicit reciprocal compensation payments — traffic imbalances and the growth in payments by ILECs to CLECs for termination of ISP-bound calls — are properly viewed as the outcome of exactly the type of competition that the *Telecommunications Act of 1996* and the FCC's *Local Competition Order* was intended to promote, and do not represent market "failures" that must be remedied by further regulatory intervention.

- Despite the recent revival of interest in a bill-and-keep model for intercarrier compensation — which was flatly opposed by most ILECs when first considered in post-*Act* arbitrations and regulatory proceedings to establish reciprocal compensation rates — the economics of bill-and-keep have not changed from the period when the FCC previously concluded that it was reasonable to apply *only* when carriers exchanged traffic that was roughly balanced so that *mutual* compensation would take place.

- The OPP papers cited in the NPRM fail to afford a sound economic or policy basis for regulators to impose "bill-and-keep" arrangements as the preferred solution for intercarrier compensation on ISP-bound calls and other locally-rated traffic. The OPP papers:

(1) Fail to recognize the intrinsic linkage between the method adopted for intercarrier compensation and the retail prices paid by end users, which causes their analyses to be fundamentally incomplete, and fail to appreciate the enormous disruptions and formidable regulatory burdens that would arise in the attempt to transition to their proposed "bill-and-keep" arrangement.

(2) Make certain assumptions concerning the allocation of the benefits and costs of a call between the calling and called parties, assumptions that are unsupported by any factual evidence and that are most likely wrong as an empirical matter.

(3) Inconsistently combine theoretical and pragmatic considerations to support their concrete proposals for how interconnection should be priced.

(4) Unduly defer to existing architectures and practices of ILECs, in effect requiring entrants to accept what amounts to a "take-it-or-leave-it" set of interconnection conditions, such as existing ILEC local calling area definitions and the premise that inward and outward traffic that is out-of-balance is categorically to be discouraged.

- When evaluated using appropriate criteria, including economic efficiency, competitive neutrality, and impacts upon end users, neither bill-and-keep nor other options that have been considered for application to ISP-bound traffic, including traffic imbalance thresholds and access charge treatment, would provide a satisfactory alternative to the existing form of reciprocal compensation arrangements.

Conclusion

The current system of explicit reciprocal compensation for interconnecting LECs has generally worked well and in harmony with the pro-competitive policies underlying the *Telecommunications Act of 1996.* When certain CLECs perceived a competitive advantage over ILECs in providing call termination services to ISPs and other high-volume customers, they were able to define and succeed in that market, and in so doing have exerted competitive pressure on the ILECs' interconnection rates generally, exactly as the FCC's policy of establishing symmetrically-applied interconnection rates was intended to do. Cost-based reciprocal compensation, of the form in place today, is the only mechanism that is competitively-neutral, allows all LECs flexibility in defining the market segments they wish to pursue, whether or not the resulting traffic patterns are balanced, and can ensure that each LEC will be fully compensated for its work in completing calls. In contrast, the so-called "bill-and-keep" approach will satisfy none of those objectives, and would seriously disadvantage CLECs in favor of ILECs in a manner contrary to the *Act.* The FCC and other

regulators should not adopt mandatory bill-and-keep (but allow it to be negotiated, when two interconnecting carriers agree it is mutually advantageous to do so) for ISP calls or any other locally-rated traffic, and instead should focus its efforts on ensuring that the existing reciprocal compensation system for LECs is applied in good faith by all market participants.

Table of Contents

EFFICIENT INTERCARRIER COMPENSATION MECHANISMS FOR THE EMERGING COMPETITIVE ENVIRONMENT

1 INTERCARRIER TRAFFIC IN A COMPETITIVE, MULTI-CARRIER ENVIRONMENT

Interconnection and the mutual exchange of traffic

Interconnection — the ability to interchange traffic among multiple telecommunications networks — may well be the single most important element in a competitive, multi-carrier telecommunications marketplace. The value of a telecommunications network is a function of the number of individual users that are connected to it, either directly or via an inter-network connection. Carriers with large, ubiquitous networks, such as incumbent local exchange carriers (ILECs), would thus possess a formidable market advantage over smaller rivals were the new entrants prevented from interconnecting their networks with those of the ILECs. Indeed, there is probably no realistic scenario under which a carrier could survive whose network does not offer its users the same level of connectivity as is available from ILECs.[1]

It is thus not surprising that interconnection was among the earliest competitive policy issues to be addressed by the FCC when, in 1971, it issued the landmark *Specialized Common Carrier* ruling that, among other things, authorized "Other Common Carriers"

1. One of the earliest FCC moves toward telecommunications competition is found in its 1959 *Above 890* decision, 27 FCC 359, 396 (1959), which made spectrum available for general use private microwave networks. Previously, private microwave was largely restricted to "right-of-way" companies such as railroads, pipelines and certain (non-telecommunications) public utilities. However, in authorizing private microwave networks for internal corporate telecommunications uses, the Commission *did not* require that local or long distance public telephone networks allow any interconnection by the private systems. Not surprisingly, private microwave never became a significant competitive alternative to the monopoly public network services, and it was not until MCI sought interconnection rights as part of its initial application, filed in the mid-1960s, to construct a common carrier microwave system in the Chicago-St. Louis corridor that the Commission was confronted with the actual economic significance of interconnection to the development of competing telecom networks. See *Specialized Common Carrier Services, First Report and Order*, 29 FCC 2nd 870, 940 (1971). *Recon. denied*, 31 FCC 2nd 1106 (1971). *Aff'd sub nom. Washington Utilities & Transportation Commission v. FCC*, 513 F. 2d 1142 (9th Cir. 1975).

("OCCs") to interconnect with the Bell System's and Independent telcos' then-incumbent monopoly local and long distance networks.[2]

It is also not surprising that the incumbent telecommunications monopolies have from the outset opposed — and to this very day continue to resist — interconnection requirements that have been imposed upon them by FCC regulation and by Congressional legislation.[3] As a direct result of their 100+ years of protected monopoly status, the incumbent local exchange carriers have been able to construct ubiquitous networks that support universal connectivity with virtually all residential, business, institutional, and government telecommunications users nationwide. Moreover, the incumbent carriers have long recognized the importance of interconnecting *among themselves* to the point where, from the perspective of most users, there is only one seamless national, wall-to-wall "public" telecom network. In fact, but for the requirement that ILECs interconnect with *non-incumbent*, competitive carriers, the incumbent monopolies would possess a literally insurmountable advantage vis-a-vis their new and far smaller rivals, such that meaningful competition from these entrants would be, for all practical purposes, essentially unthinkable. Mandatory interconnection means that at least this aspect of the incumbents' various competitive advantages are attenuated to the point where even the smallest entrant can offer its subscribers access to anyone, anywhere.

Interconnection among multiple networks has, in fact, long been a standard practice in "network-based" industries such as telecommunications and transportation. Even before competition was introduced into the telephone industry beginning in the 1970s, no single incumbent monopoly owned or controlled a network offering "on-net" ubiquitous nationwide connectivity. In fact, at one point there were more than two thousand incumbent local exchange monopolies with subscriberships varying between less than one hundred to the tens of millions. Significantly, however, these networks were *non-overlapping* with respect to their geographic coverage; at any single location, customers would only be offered service by a single provider. The non-overlapping incumbent monopolies readily interconnected *with one another*, because by so doing each would make its own network far more valuable to its customers — and thus capable of generating substantially more revenue overall — than would be the case if each carrier's network were operating as an island, isolated from anything beyond its necessarily limited geographic footprint. The problem, of course, was that membership in this exclusive "club" was strictly limited to incumbent monopolies; no competing carriers whose serving areas overlapped with any incumbents were invited to join.

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2. *Specialized Common Carrier Services*, First Report and Order.

3. The duty of ILECs to interconnect with competing service providers is expressly stated at Section 251(c)(2) of the *Telecommunications Act of 1996*. ILECs must also comply with the more general interconnection obligation set forth in Section 251(a)(1) which applies to all telecommunications carriers.

The *Telecommunications Act of 1996* (as well as pioneering state legislation that in some cases predated the *Act*) created a new era by establishing a legal right for new market participants, the competitive local exchange carriers (CLECs), to secure interconnection with the incumbent LECs (ILECs). However, it was the FCC's August, 1996 *Local Competition Order* that implemented the *Act's* new interconnection requirements.[4] In brief, the *Local Competition Order* established a system of explicit reciprocal compensation payments between ILECs and CLECs, with rate levels to be determined on the basis of the ILEC's costs (calculated in accordance with the "Total Element Long Run Incremental Cost" (TELRIC) methodology). Importantly, interconnection rates were to be applied symmetrically, so that the same cost-based rate applied to locally-rated traffic exchanged in either direction.[5] Acting under these guidelines, state regulators have approved numerous interconnection agreements between ILECs and CLECs that have allowed CLECs to enter the market and attempt to compete for local exchange service customers.

The "Intercarrier Compensation" Rulemaking

In April 2001, the FCC took two actions that, taken together, constitute an attempt to effect a radical alteration to the financial relationships between carriers applicable to the exchange of traffic between their interconnected networks (which are generically referred to as "intercarrier compensation" arrangements). First, on April 18, the FCC adopted an Order on Remand and Report and Order that established a new regime for the intercarrier compensation applicable to so-called "ISP-bound traffic," i.e., dial-up calls destined to an Internet Services Provider (ISP).[6] Two years earlier, the FCC had issued a Declaratory Ruling finding that ISP-bound traffic was jurisdictionally mixed and largely interstate, and on this basis ruled that the reciprocal compensation obligations that had been established in the *Telecommunications Act of 1996* for the exchange of local traffic would not apply for ISP-bound traffic. That Declaratory Ruling was subsequently vacated in part by the U.S. Court of Appeals for the D.C. Circuit and remanded to the FCC, after the Court had determined that the FCC had failed to provide sufficient justification for its conclusion that ISP-bound

4. *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, rel. August 8, 1996, 11 FCC Rcd 15499, 15844-15856 and 16217-16219 (*Local Competition Order*), aff'd in part and vacated in part sub nom., *Competitive Telecommunications Ass'n v. FCC*, 117 F.3d 1068 (8th Cir. 1997) 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.*, 119 S. Ct. 721 (1999).

5. *Id.*, at paras. 1085-1089.

6. *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996 and Intercarrier Compensation for ISP-Bound Traffic*, CC Docket Nos. 96-98 and 99-68, Order on Remand and Report and Order, FCC 01-131 (adopted April 18, 2001) (*"ISP Remand Order"*).

traffic should be classified as interstate.[7] In the *ISP Intercarrier Compensation Order*, the FCC advances a new, different rationale to support its earlier conclusion that ISP-bound traffic does not qualify for reciprocal compensation.[8] In addition, the order establishes a mechanism, including progressively lower per-minute rate caps and limitation on the extent of traffic growth over the next three years, intended to transition ISP-bound traffic from reciprocal compensation payments to a "bill-and-keep" arrangement in which LECs exchange traffic without any explicit compensation for terminating the traffic handed off by another LEC.[9] Importantly, the Order also ties application of the rate caps for ISP-bound traffic to comparable treatment for non-ISP traffic: The rate caps can be applied only if the ILEC offers to exchange *all* local traffic (within a given state) at the same rate.[10] The FCC explained that this "mirroring" requirement is necessary because the record before it "fails to establish any inherent differences between the costs on any one network of delivering a voice call to a local end-user and a data call to an ISP," so that the same intercarrier compensation framework and rates should apply to both types of traffic.[11]

In the companion *Notice of Proposed Rulemaking* (NPRM) adopted on April 19, 2001, the FCC has proposed a "unified intercarrier compensation regime" founded upon the bill-and-keep approach, that would encompass not only ISP-bound traffic and ordinary voice local calls, but also interstate access traffic as well.[12] As expressed in the NPRM, the FCC sees the objectives of this initiative as including the following:

- Increasing the efficiency of intercarrier compensation arrangements;[13]

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7. *Bell Atl. Tel. Cos. V. FCC*, 206 F.3d 1 (D.C. Cir. 2000) (*Bell Atlantic*).

8. Specifically, the FCC now finds that ISP-bound traffic falls into the category of "information access," which it contends is exempted from the reciprocal compensation obligations set forth in Section 251(b)5) of the *1996 Act* because of the "carve-out" provision for information access appearing at Section 251(g). *ISP Remand Order*, at paras. 34-35.

9. *Id.*, at paras. 77-88.

10. *Id.*, at para. 89.

11. *Id.*, at para. 90.

12. *Developing a Unified Intercarrier Compensation Regime*, CC Docket No. 01-92, Notice of Proposed Rulemaking, FCC 01-132 (adopted April 19, 2001) ("*Intercarrier Compensation NPRM*"), at paras. 2-4. As discussed later in this report (Chapter 3), the *NPRM's* specific proposals appear to fall well short of this ambitious vision and may instead lead to imposition of bill-and-keep only upon ISP-bound traffic.

13. *Id.*, at para. 33.

- Eliminating or at least reducing "the opportunities for regulatory arbitrage created by the existing patchwork of intercarrier compensation rules;"[14]

- Moving away from regulatory intervention in intercarrier compensation, towards more "market-oriented" mechanisms that could be "largely self-administering."[15]

In its consideration of these issues in the *Intercarrier Compensation NPRM*, the Commission relies upon two papers prepared by FCC economists and issued by the FCC's Office of Plans and Policy (OPP) that purport to analyze intercarrier compensation alternatives from the ground up, i.e., beginning from basic economic principles and defined policy objectives.[16] In order to respond to the FCC's intercarrier compensation initiative and the particular proposals advanced in the two OPP papers, this report must similarly begin with a review of the economic and policy fundamentals underlying the interconnection arrangements between telecommunications carriers, as we do below.

Interconnection and intercarrier business relationships

When the provision of a requested connection involves more than one carrier's network, some process needs to be established for an apportionment of the total charge paid by the customer for the service among the participating providers. There are a number of possible business models that can apply in this situation:

(1) The customer can purchase the component services directly from each of the providers, at prices established by or negotiated with each, and arrange for the component services to be interconnected so as to provide for end-to-end connectivity.

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14. *Id.*, at para. 11, footnote omitted. By "regulatory arbitrage," the FCC refers in part to allegations that the CLECs focusing on the ISP market are amassing windfall profits under the existing symmetrically-applied termination rates for reciprocal compensation.

15. *Id.*, at para. 34.

16. DeGraba, Patrick, *Bill-and-Keep at the Central Office as the Efficient Interconnection Regime*, OPP Working Paper No. 33 (December 2000); Atkinson, Jay M. and Christopher C. Barnekov, *A Competitively Neutral Approach to Network Interconnection*, OPP Working Paper No. 34 (December 2000). While we recognize that each paper includes a disclaimer on its frontipiece stating that "given the preliminary character of some titles, it is advisable to check with the authors before quoting or referencing these working papers in other publications," we also note that the *Intercarrier Compensation NPRM* cites to both papers extensively.

(2) The customer deals directly with only one provider, who then arranges for the required services from the other participating providers and engages in financial settlements with those other participating providers.

(3) Some combination of (1) and (2).

Consider the following example from the transportation industry. A passenger takes a trip from her home in Washington to visit her friend in Albuquerque. Although this trip could be completed on the same airline, the passenger might want to change airlines at some interconnecting point in order to obtain preferred flight times or simply because she needs to stop off at that location. In this example, the passenger could purchase a Washington-Chicago ticket from American Airlines and then a separate Chicago-Albuquerque ticket from United Airlines. Alternatively, she can purchase the entire ticket from American (the originating carrier). Generally, where two or more airlines are involved in a particular routing, the customer typically deals only with only one carrier in effecting the service transaction (i.e., arranging and paying for the freight shipment or making flight reservations and paying for the ticket for the entire trip). In the airline industry, the *originating* carrier (i.e., the carrier that provides the initial flight segment) will book the flights and issue the ticket for the entire trip, even if more than one carrier is involved. In fact, our passenger still needs to get from her home to the airport in Washington and from the Albuquerque airport to her friend's house, and may engage common carriers (for example, taxis or busses) for one or both of these segments as well. However, in most (but not all) cases, the passenger will deal with the ground transportation providers directly (although some airlines will also arrange for ground transportation as part of a first or business class ticket). So both intercarrier models may be employed in configuring a complete end-to-end trip.

Where one provider acts on behalf of others in ordering and configuring the interconnected components of the end-to-end service, it will need to enter into some type of business relationship with the connecting carriers to compensate them for the services they are called upon to provide. Any of several types of business models might be used for this purpose. In this discussion, we will refer to the carrier that accepts the request for service and receives payment from the end user customer as the "transacting carrier," and will refer to all other carriers that are involved in fulfilling the requested service as the "participating carriers."[17] Significantly, there is no requirement that the *transacting carrier* also be the *originating carrier* — the carrier on which the telephone call or travel is initiated.

17. Our choice of the terms "transacting carrier" and "participating carrier" rather than, for example, "originating carrier" and "connecting carrier" reflects the fact that the first carrier that the end-user encounters need not be the one with whom he or she transacts the order or request for service.

(1) The transacting carrier purchases specific services from the other participating carrier(s), perhaps at wholesale prices, and either resells them directly or incorporates them into the (value-added) service it provides to the end user customer.

> *Interexchange carriers purchase and pay for switched access services from LECs, interconnect and combine them with their own interexchange transport service, and provide the end-to-end connectivity in the form of retail "long distance calls" to their end user customers.*

(2) The transacting carrier enters into a peer-to-peer interconnection arrangement, whereby it "hands off" the customer's traffic to the participating carrier at an agreed-upon point of interconnection, with the carriers sharing in some agreed-upon manner the payments received by the transacting carrier for the service.

> *In our airline example above, American Airlines receives payment from and issues the ticket to the end user customer, and remits an agreed-upon portion of that payment to United Airlines for the flight segment that United will provide.*
>
> *The transacting local exchange carrier receives payment for and provides an end-to-end local call to its customer where the called party is served by a different local carrier. The transacting carrier hands-off the call to the other LEC with which it is interconnected, and remits an agreed-upon portion of the payment for the connecting carrier's work in completing the call to its end user local service customer.*

Where the transacting carrier purchases services from, and hence is a customer of, the participating carrier (as in the IXC/LEC relationship described in Case (1) above), such payments could reasonably be viewed as constituting "costs" to the transacting carrier; indeed, in some cases the transacting carrier might confront the alternative of purchasing the interconnected service from one of several other carriers, or of producing the service itself.[18] Where the relationship is peer-to-peer and the remittance is in the form of a revenue-sharing arrangement, the payment should not be considered a "cost" to the

18. IXCs have in fact pursued both of these alternatives. They regularly purchase special access type services from "competitive access providers" ("CAPs") to serve high-volume end-user customers, and have themselves pursued entry into the wireless, cable and CLEC markets as alternative (non-ILEC) means of delivering their long distance services to end-user customers.

transacting carrier; rather, it is simply a *remittance* paid by it to one or more other carriers for their share of the total service that is being furnished to the customer.[19]

There are several types of peer-to-peer compensation arrangements that are commonly used for hand-offs between network-based providers, whether in telecommunications, transportation, or other fields:

(1) *Reciprocal compensation* — the transacting carrier makes a cash payment to the participating carrier for those components of the total end-to-end service that the latter provides. In many cases, either party may sometimes act as the transacting carrier while at other times be the participating carrier. Where carrier A is the transacting carrier and carrier B is the participating carrier, A makes a cash payment to B. Conversely, where carrier B is the transacting carrier and carrier A is the participating carrier, then B makes a cash payment to A.

(2) *Reciprocal compensation with a net settlement* — essentially the same as method (1), except that the two cash flows (A-to-B and B-to-A) are netted off against each other, with a net cash payment running from the carrier with the larger reciprocal compensation obligation. If the payments arising from the two traffic flows are exactly equal,[20] no payment in either direction would take place.

(3) *In-kind exchange of services* — where the respective values of the services that each of the two connecting carriers furnishes to the other are approximately the same or, more specifically, where the *difference* between those two values (i.e., the amount that would be paid under the "reciprocal compensation with a net settlement" method) is less than the costs that the two carriers would incur in making detailed measurements of the volume of service each provides to the other ("transaction costs") *and* where neither party would have an incentive or ability to "game" the arrangement by taking advantage of the fact that it was not confronting any usage-sensitive charge for its use of the connecting carrier's services, the carriers may agree on an "in-kind" exchange of services where no actual cash

19. The initial carrier might incur transaction costs relating to its role in facilitating the end-to-end service, e.g. in performing billing and collection functions for the connecting carriers. However, any such costs are conceptually distinct from (and typically minimal in comparison to) the revenues that ultimately must flow to the connecting carriers as compensation for their services.

20. Note that what is relevant here is the amounts of the *payments* rather than the volume of traffic. Where each carrier's charge per unit of traffic to the other is the same, the payment and traffic relationships will necessarily be proportionate to one another. In theory, there is no requirement that the charges be the same. However, as we shall explain, setting the respective charge levels for peer-to-peer interconnection is a reasonable default condition that should only be modified under certain special circumstances.

> changes hands. Under such an arrangement, carrier B would agree to complete calls handed off to it by carrier A without any explicit charge or payment, in exchange for which carrier A would agree to complete calls handed off to it by carrier B without any explicit charge or payment.

Interconnections between carriers with non-overlapping geographic footprints (i.e., between two carriers that do not compete directly with one another) typically produce "balanced" traffic flows, i.e., the volume of traffic originated on A and handed off to B is approximately equal to the volume of traffic originated on B and handed off to A. In-kind compensation arrangements are particularly well-suited to situations in which traffic is roughly in balance, because the transaction costs associated with detail usage accounting and billing would typically exceed the "inequity" of any small systematic imbalance. Traditionally, interconnection arrangements between and among incumbent LECs with non-overlapping service territories (e.g., Bell-Independent) have been structured along these lines.

However, where the interconnecting carriers have overlapping geographic footprints (as in ILEC-CLEC interconnections), traffic flows are unlikely to be in balance. The reason: As new entrants into a market long served exclusively by an ILEC, CLECs will necessarily be forced to target certain types of customers whose collective traffic characteristics are unlikely to be simply a scaled-down version of the traffic characteristics of the entire ILEC customer population. Indeed, CLECs are not required to become mere miniature versions of ILECs; they are expected to innovate, specialize, and to target their service offerings to satisfy customer needs that may not be adequately met by the existing providers.

There is in fact no requirement that a CLEC's traffic adhere to any predetermined set of attributes. In a closed, pure monopoly world, there will necessarily be roughly as many calls originated by ILEC customers as there are calls delivered to ILEC customers,[21] although *individual customers* may present imbalances between incoming and outgoing traffic. That aggregate condition will not apply to individual carriers in a competitive, multi-carrier environment. Depending upon which customers a given CLEC serves and the traffic characteristics of each, that CLEC may either handle more call originations than terminations, or vice versa; in fact, a traffic pattern that is perfectly "in balance" would be highly coincidental. And to the extent that some, perhaps large, fraction of all of the traffic of a given CLEC is either handed-off to or received from another LEC, there will almost certainly be an imbalance of traffic flows as between the CLEC and the other LEC that generally reflect the traffic attributes of the CLEC's customer base.

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21. To the extent that some call *attempts* are not completed (because the attempt results in a busy or no-answer condition), the aggregate number of call originations will generally exceed the aggregate number of call terminations.

There is no legitimate public policy basis that would expect or require that each and every CLEC to achieve a balance of outgoing and incoming traffic, or to expect or require that each CLEC structure its mix of services and seek out a mix of customers so as to achieve that outcome. CLECs should no more be forced to emulate ILEC customer and traffic characteristics than they should be made to replicate ILEC networks or offer the services across a geographic footprint that precisely or even closely coincides with that of the dominant incumbent. Indeed, *policies that would work to promote such an outcome, or that would penalize CLECs for failing to become nothing more than smaller versions of the ILECs with which they seek to compete, are inherently anticompetitive and will work to discourage or block entry altogether.*

To be sure, while the characteristics of interconnection traffic to/from a given CLEC will reflect the nature of its customers' use of its services, the types of customers that the CLEC may target may itself be influenced by the terms of the business relationship(s) applicable to interconnected traffic flows. *It is precisely for this reason that the terms of such business relationships must closely reflect ILECs' actual costs.* Entrants must be confronted with a set of economic signals that will encourage them to make efficient business choices. As we shall discuss presently, the heart of the debate over "reciprocal compensation" lies in the *price* at which ILEC/CLEC traffic is interchanged. Setting a price that is significantly in excess of cost is no less inefficient than setting a price that is significantly below cost; both will create economic distortions and incentives for carriers to "game" the system, and both will produce inefficient economic choices, albeit in the opposite direction.

The roles of carriers participating in the provision of end-to-end telephone calls in a competitive multi-carrier environment.

The traditional practice in the telecommunications industry is that the customer who originates a call requiring participation by more than a single carrier enters into a business transaction with one carrier (although not necessarily the one over which the call is actually originated), which in turn arranges for the interconnecting services that other carriers must provide in order for the requested call to be completed.[22] In general, there are two intercarrier business models that currently apply for most wireline public switched telephone number (PSTN) traffic in the US — the "local call" model, which employs the peer-to-peer relationship (Figure 1), and the "interexchange call" model, which uses the "purchased services" approach (Figures 2 and 3). In both cases, calls are provided to the end-user

22. "Reverse-charge" or 800-type services are a special case, since the call *recipient* is the entity that has agreed to pay for the call. As we shall show, this is simply a special case of the more general "sent-paid" model that applies to virtually all telephone calls placed over the public switched network.

RECIPROCAL COMPENSATION

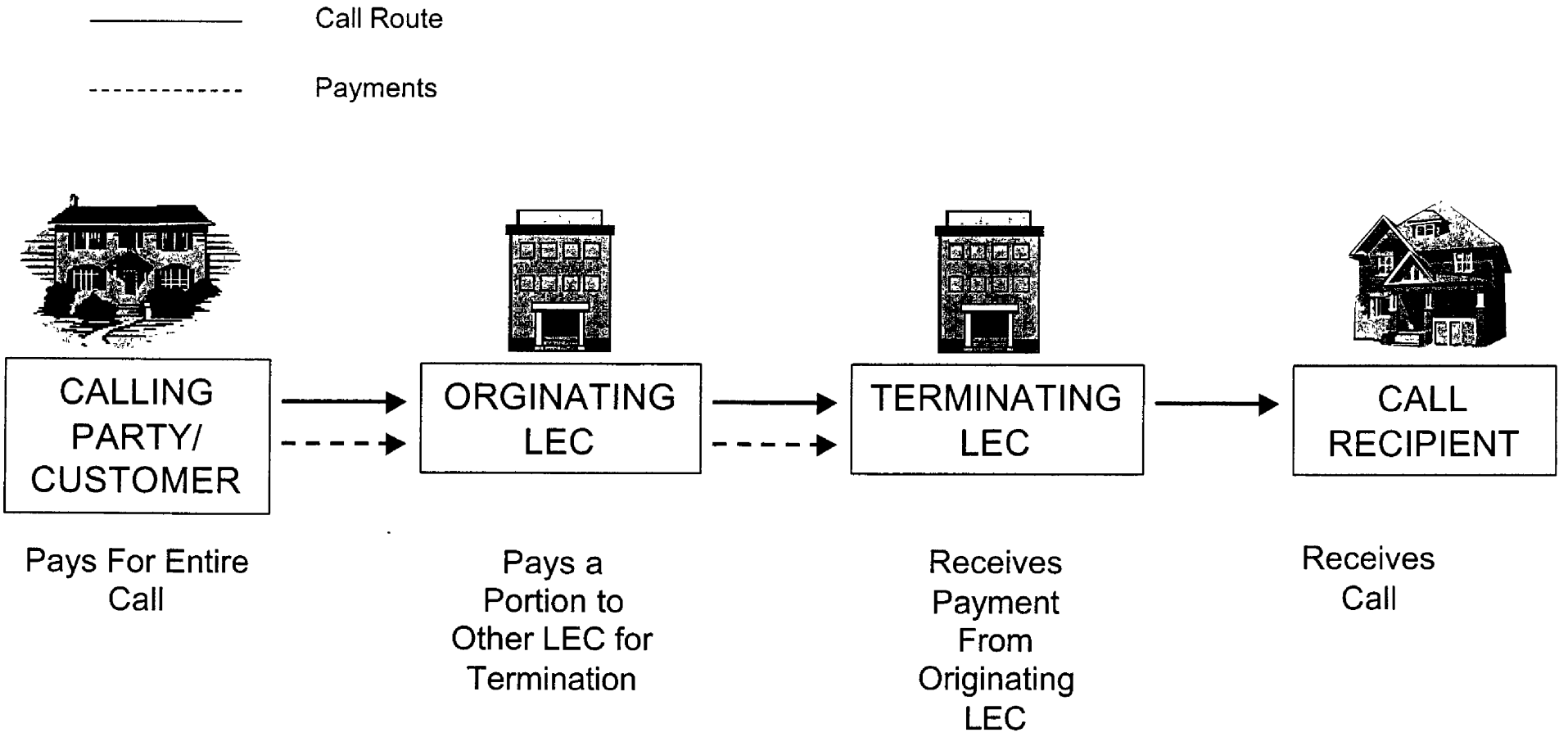

Figure 1. Call Routing and Flow of Payments Under Reciprocal Compensation

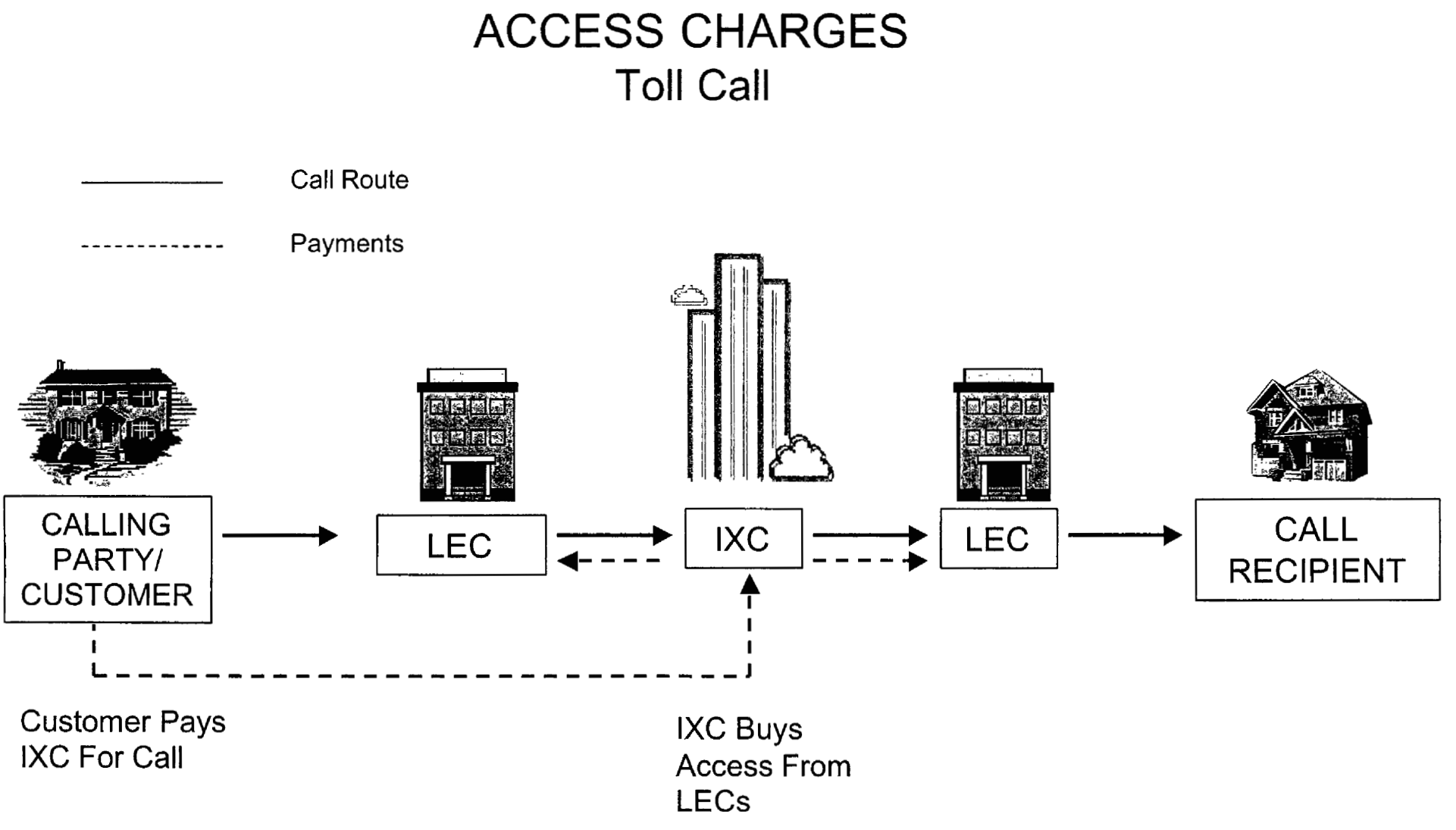

Figure 2. Call Routing and Flow of Payments for a Toll Call

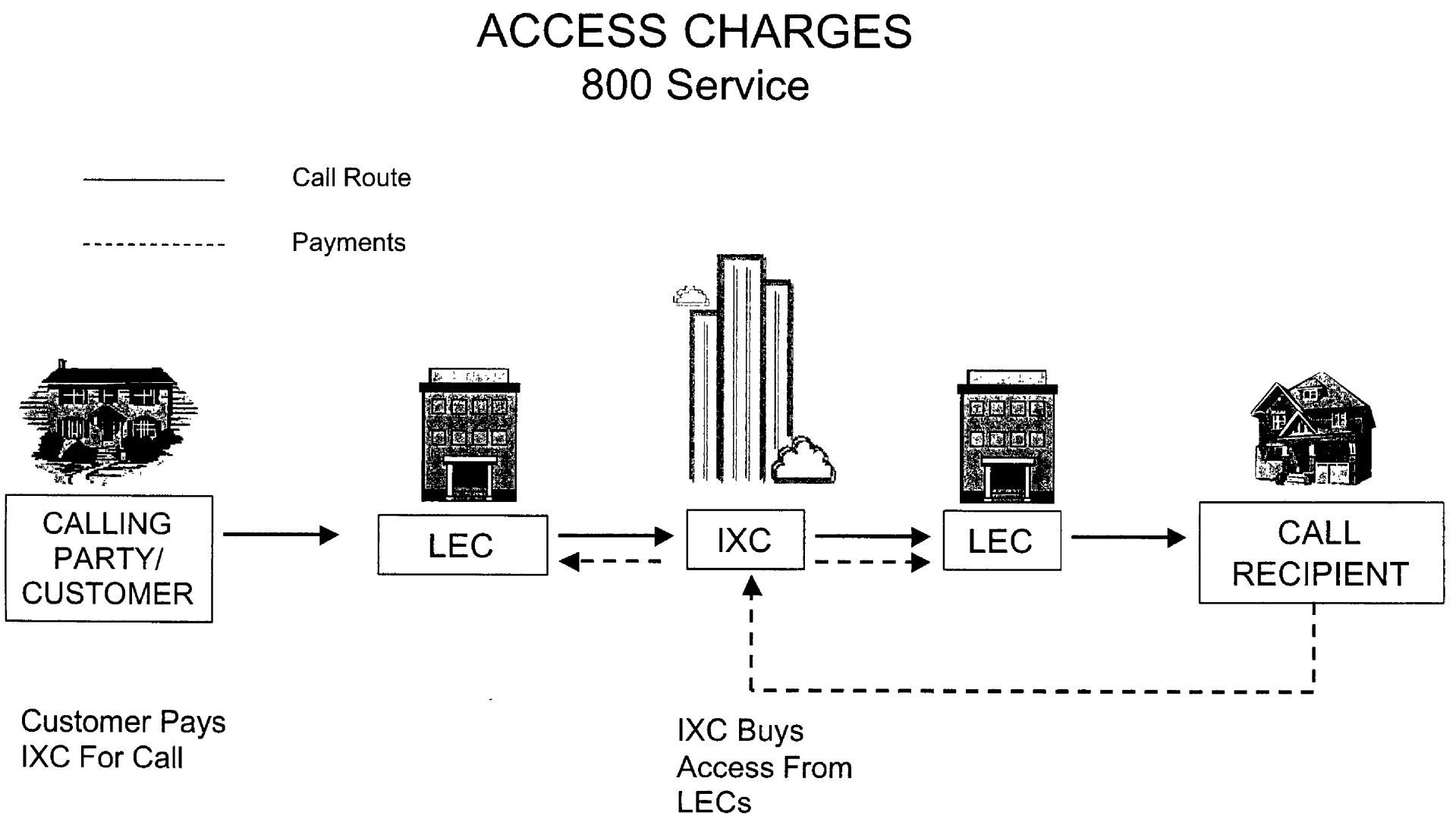

Figure 3. Call Routing and Flow of Payment for an 800-Service Call

customer on a "sent-paid" basis, with the party who originates the call (or, in the case of 800-type services, the party receiving the call) paying the *entire charge* for the end-to-end connection.

The "sent-paid" approach to charging for calls. The almost universal practice throughout the US is for calls to be provided on a "sent paid" basis by the carrier with whom the party who pays for the call has contracted for the service. In the case of local calls, that is the local exchange carrier on whose network the call originates; in the case of "long distance" calls, it is the interexchange carrier to which the call is handed-off by the originating (local) carrier whose network is used to access the IXC.[23]

In the case of local calls, the customer who originates the call pays his or her local carrier to get the local call from the point of origin all the way to its intended destination, which means that the originating carrier is compensated by its customer for local switching at both the originating and terminating ends of the call as well as for transporting the call the entire distance between the originating switch and the terminating switch. Most importantly in the context of calls involving more than one local carrier, the "sent paid" approach means that the calling party pays in full for the *termination* of the call, as well as for its origination, *even if a carrier other than the originating (and billing) carrier ultimately terminates the call* to the called party, and that the calling party's *network* (i.e., the carrier with whom the calling party maintains a customer-supplier relationship) pays the terminating carrier for its work in completing the call.

Local call "sent paid" pricing and payment arrangements can take many forms, including flat-rated local calling over a wide area; "extended area service" or "extended area calling" plans that have the same effect; flat-rated local calling over a smaller area with some type of message unit or local measured charge for local calls outside that area; flat-rated local calling for a certain number of calls per month, with a per-message or other charge for usage above that level; and even local service with no usage included in the base price at all, with each call subject to a separate local message or measured service charge.

The "sent paid" approach to local call charging has been in place since the introduction of local telephone service more than a century ago, and has long provided the framework both for the interchange of traffic as well as for the allocation of usage revenues as between two incumbent local exchange carriers (e.g., a Bell Company and an Independent Telephone Company). With the introduction of competitive local carriers into the local service market, this same longstanding sent-paid framework has been extended to the new entrants as well.

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23. One notable exception is found in the treatment that applies for calls placed *to* wireless telephones, where the calling party pays the normal landline charge (local or long distance) to reach the rate center to which the called (wireless) number has been assigned, and the wireless call recipient pays the wireless carrier for the "air time" associated with the incoming call.

Under the present "Calling Party's Network Pays" ("CPNP") paradigm, when two interconnecting carriers (A and B) jointly complete a local call, the originating carrier that receives payment from its end-user customer who placed the call is responsible for paying the carrier that terminates the call (Figure 1). Carrier A is paid by its customer to complete a "full call," but itself performs only a "half-call" (from origination to hand-off point), and thus must pay Carrier B to perform the second "half-call" (from hand-off point to termination). Such "payments" may be in cash, made on a net settlement basis, or through an "in-kind" exchange of services under which no cash changes hands, or some combination of these devices.

Like local calls, long distance calls are also placed on a sent-paid basis. However, in the case of "long distance" calls involving an interexchange carrier, the CPNP paradigm is accomplished via a different intercarrier compensation model (the "access charge model"). Generally, such calls are originated by the end-user customer over the same local carrier that provides local exchange service to that customer. Administratively, the call is carried by the originating local carrier to the interexchange carrier designated by the customer using the local carrier's "switched access" service. The call is then handed-off to the IXC for interexchange transport, and then handed-off by the IXC to another local carrier (the one that provides local exchange service to the called party) using that carrier's "switched access" service for delivery to the call recipient.[24]

Under the access charge model, the end-user who originates a call is the customer of the IXC, *despite the fact that the call itself is generally originated over the LEC from which the end-user purchases local telephone service.* The IXC is, in turn the *customer* of the LEC. That is, when the end-user places a call via an IXC, the call is routed by the LEC from the end-user's phone to the IXC as a "switched access" service, and the charge for that switched access service is billed by the LEC to the IXC (Figure 2). Indeed, the IXC will be charged for the switched access connection even if the ultimate call is not completed, i.e., where it reaches a busy or no-answer condition. The IXC also pays switched access charges to the LEC at the terminating end of the call, for transporting and delivering the call from the IXC's "point of presence" ("POP") to the ultimate recipient of the call. Neither the call originator nor the call recipient are billed by their respective LECs for the switched access service. The IXC is billed by the two LECs for these access services, and recovers those payments, along with its other costs (e.g., the cost of transporting the call between LATAs, retailing costs associated with marketing, billing and collection, etc.) in retail long distance rates that it charges to its end-user customers. A similar business relationship applies in the case of 800-type services, except that the called

24. In some cases — particularly where high volumes of traffic from or to a specific customer location are involved — the connection between the end user and the IXC is accomplished via a dedicated facility (as opposed to a switched connection) known as a "special access" service. Most such "special access" facilities are also furnished by local exchange carriers, either incumbent or competitive.

party — the 800-service customer — rather than the calling party, pays the IXC for the call (Figure 3).

The choice of business model ("local" vs. "access") is — or should be — based primarily upon transactional convenience; there is no *theoretical* reason why one approach is necessarily superior to the other in all situations. The interchange of local traffic typically involves only two carriers, whereas the interchange of long distance traffic almost always involves at least three.[25] Because the interchange of local traffic ordinarily involves a direct bilateral intercarrier linkage at a mutual point of interconnection, a direct peer-to-peer *business* relationship is often the simplest to implement and administer. In the case of long distance services, intercarrier connectivity is far more complex, and the two local access carriers typically do not directly interconnect with one another at all. The IXC, on the other hand, is directly connected to LECs at both ends of each call, so a business model in which the IXC provides the common business link with the customer and with each of the two access carriers may well be the most operationally efficient solution.[26]

In addition to these *operational* considerations, it is also important to recall that the access charge regime was put in place back in 1984 as a means for maintaining the preexisting and longstanding flow of subsidy support from "long distance" calls to "basic local exchange service." By paying LECs access charges that had been deliberately set well in excess of the actual traffic-sensitive cost of the access service, IXCs would be forced to maintain the predivestiture, pre-competition subsidy structure. To the extent that access charge-driven subsidies are in the process of being phased out,[27] the use of the access charge model for this purpose has become far less important.

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25. The same corporate entity may in fact provide the switched access service at both ends of a long distance call (e.g., Verizon Pennsylvania is the access provider at both ends of a call from Philadelphia to Pittsburgh), and following Section 271 approval may furnish the interexchange segment as well. However, since these activities are (in theory) functionally separate and are frequently provided by *different* corporate entities, it is useful to treat the access providers at both ends of a long distance call as if they were separate local carriers and separate from the interexchange carrier as well.

26. A third, and enormously more complex, type of business relationship was posited by a number of CMRS providers responding to the FCC's *Wireless Calling Party Pays* rulemaking (WT Docket No. 97-207). Under the transaction model envisioned by these carriers, the calling party would, in addition to his traditional business relationship with the local and, where applicable, long distance carriers that handle the call to a CMRS telephone, also have a business relationship with the CMRS carrier served by the *call recipient*. The CMRS carrier on whose network the call was terminated would then bill the *calling party* for the airtime, either directly, via a credit card whose number was provided by the calling party at the time that the call was placed, or via billing and collection services furnished by the originating LEC.

27. See *Access Charge Reform et al*, CC Docket No. 96-262, 94-1, et al, Sixth Report and Order in CC Docket Nos. 96-262 and 94-1, Report and Order in CC Docket 99-249, and Eleventh Report and Order in CC Docket No. 96-45 (CALLS Order), adopted May 31, 2000.

Intercarrier compensation for local calls. The term that is generally used to describe the payment relationships applicable for intercarrier local calls is *reciprocal compensation.* Such compensation arrangements for calls involving an two different LECs are expressly *required* by Sections 251(b)(5) and 252(b)(2)(A) of the 1996 *Act.*[28] Reciprocal compensation consists of the payments made by the first (originating) carrier to the second (terminating) carrier for its work in completing the call. It is referred to as "reciprocal" in that the flow of payments is intended to mirror the flow of traffic; i.e., Carrier A pays Carrier B for terminating calls originated on A and handed off to B for termination, and Carrier B pays Carrier A for terminating calls originated on B and handed off to A for termination. If the amount of these payments per unit of traffic is the same in both directions, and if the traffic flow is precisely in balance (i.e., A gives B the same amount of traffic as B gives A), then no net payment, in either direction, would take place. Specific compensation mechanisms, including explicit cash and in-kind payment arrangements, are discussed further below.

The entry of *competing* local carriers into the telecommunications landscape has fundamentally altered the nature of intercarrier compensation. In the pure monopoly world, in which ILECs' service territories were never overlapping and where ILECs and IXCs generally did not compete with one another (any more than taxis that carry people from their homes to the airport compete with airlines that carry passengers between airports), intercarrier compensation payments (in whatever form and under whatever business model) were essentially a form of revenue-sharing among "partners" in a national telecommunications network. But CLECs and ILECs do compete for the same customers, and payments by one to the other for its participation in a given service transaction, while constituting revenue-sharing as well, also represent "competitive losses" in the sense that had the carrier served both the call originator and call recipient, it would not have had to "share" its revenues with anybody.

Reciprocal compensation payments made by originating LECs to terminating LECs are thus not "costs" to the originating carrier in the traditional sense. Rather, they represent *competitive losses* in that the originating ILEC might have in the past carried the entire call if the CLEC were not present in the market. However, the payment (in whatever form) made by the ILEC to the CLEC for traffic handed-off to the CLEC is simply a remittance

28. Specifically, 47 U.S.C. §252(b)(2)(A) provides that "[f]or the purposes of compliance by an incumbent local exchange carrier with section 251(b)(5), a State commission shall not consider the terms and conditions for reciprocal compensation to be just and reasonable unless (i) such terms and conditions provide for the mutual and reciprocal recovery by each carrier of costs associated with the transport and termination on each carrier's network facilities of calls that originate on the network facilities of the other carrier; and (ii) such terms and conditions determine such costs on the basis of a reasonable approximation of the additional costs of terminating such calls."

of monies collected from the ILEC's customer for a total end-to-end service a portion of which is furnished by a connecting carrier rather than by the ILEC itself.

Establishing an appropriate business model for the interchange of local traffic.

From the foregoing discussion, it is now possible to set down certain core principles that should govern the establishment of a competitively appropriate and economically efficient business model for compensating interconnected carriers for their respective participation in the interchange of local traffic.

(1) The compensation arrangement should stimulate efficient economic decisions by entrants, encouraging them to compete with incumbents in those areas where they are or can be more efficient than the incumbent LEC.

(2) The compensation arrangement should be competitively neutral, conferring no special benefit or exacting any specific disadvantage upon any party merely by virtue of its incumbency, network architecture, scale or scope.

(3) The compensation arrangement should expressly recognize the potential for market diversity, innovation, and experimentation, and as such should not embrace, reflect, or impose any predisposition as to any one particular market outcome (such as one in which balanced originating/terminating traffic for each CLEC is achieved) or that would penalize any party for deviating from, or failing to achieve, that result.

(4) The compensation arrangement should be comprehensive and consistent across all network functions having substantially similar economic and technical characteristics and costs.

(5) The compensation arrangement should, to the extent possible, accommodate and harmonize with preexisting retail market pricing practices and, to the extent that the compensation arrangement cannot be conformed to such practices, it should only be implemented if this can occur concurrently with a comprehensive revision of retail pricing embracing all services and all jurisdictions.

(6) The compensation arrangement should be relatively simple and straightforward and should be capable of being implemented, maintained and administered efficiently and with a minimum of transaction-related costs.

(7) The compensation arrangement should be transparent to the end user, creating no differentiation in retail end user pricing of services based upon whether the end-to-end call is completed by one or by more than one carrier.

(8) Once adopted, the compensation arrangement should be maintained in place on an essentially permanent basis, subject only to minor "technical corrections" whose purpose is primarily ministerial in nature.

The first two of these principles requires that the compensation arrangement be *cost-based* and, in particular, that it be based upon the *ILEC's costs*. If the charge that the transacting carrier is required to pay to the providing carrier is set in excess of the ILEC's cost, a less efficient CLEC would nevertheless be incented to enter the market and offer service. On the other hand, if the payment is below both the ILEC's and that CLEC's cost, a *more efficient* CLEC would be discouraged from entry. By setting the compensation rate at the *ILEC's* cost, CLECs are rewarded for their incremental efficiency and are thus encouraged both to enter the market and to pursue efficiency-enhancing measures.[29] The requirement for "competitive neutrality" in the second principle would prohibit an intercarrier compensation mechanism from conferring any special advantage or imposing any disadvantage upon, any particular category of carriers.

The third principle would prohibit the basis for or amount of intercarrier compensation to be driven or prejudiced by any particular market outcome such as, for example, one that would envision or assume that traffic flows would be "in balance" as between the two interconnecting carriers. Such a predisposition penalizes an entrant for pursuing a business plan calling for market specialization, and presupposes a market outcome in which entrants are little more than smaller versions of the incumbents.

Closely related is principle (4), which would prohibit the intercarrier compensation payment to be driven or prejudiced by the nature of the service being provided by the CLEC, the use of that service, or the type of customer that the CLEC may be serving. Existing intercarrier compensation arrangements violate this principle in many important

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29. ILECs have argued strongly in favor of, and the FCC has adopted, this same principle with respect to the ILECs' retention of efficiency gains under price cap regulation. See *Price Cap Performance Review for Local Exchange Carriers*, CC Docket No. 94-1, First Report and Order, FCC 95-132 (adopted March 30, 1995) ("*LEC Price Cap Performance Review*"), at paras. 172, 187-188; and Fourth Report And Order In CC Docket No. 94-1 And Second Report And Order In CC Docket No. 96-262, FCC 97-159 (adopted May 7, 1997) ("Fourth Report And Order"), at paras. 147-149. Specifically, ILECs have held that if they are required to "share" any of their efficiency gains with ratepayers, their incentives to pursue efficiency-enhancing and productivity-improving initiatives would be severely diminished. Extending this same reasoning to ILEC/CLEC intercarrier compensation, if ILECs are permitted to "benefit" from CLEC efficiency gains by paying reciprocal compensation rates that track the *CLEC's* costs, then CLECs' incentives to pursue efficiency-enhancing and productivity-improving initiatives would similarly be severely diminished.

respects, and the proposed revisions as set forth in the *Intercarrier Compensation NPRM* would actually work to exacerbate the existing condition. Under both existing as well as the proposed rules, the amount of the payment is related to, among other things, whether the ultimate end-user telephone call is "local" or "long distance," whether it is "voice" or "data," and whether it terminates at a live "end user" or at an entity that has been arbitrarily designated as a telecommunications service provider. To the extent that the carrier's "work" in terms of switching, transport and termination functions, are virtually if not exactly *identical* in all of these cases, the intercarrier compensation payments should be correspondingly the same as well.

The fifth principle requires that the intercarrier compensation arrangement recognize, reflect and accommodate longstanding retail market pricing practices. Proposals such as those advanced by the FCC's Office of Plans and Policies ("OPP") for a universal "bill-and-keep" compensation paradigm (discussed in Section 3 of this report) may be incompatible with the existing "sent-paid" pricing regime applicable to end user services.

The sixth principle encourages simplicity and the minimization of transaction costs. Bill-and-keep may well satisfy this principle as between the carriers themselves, but it will engender complex and far-reaching pricing changes and new end user charges that may themselves introduce significant new transaction costs. And in that regard, bill-and-keep would clearly violate the seventh principle, because when flowed through in retail prices, it would be anything but transparent to the end user.

Finally, it is critically important that all participants in the market be confronted with reasonable predictability as to the compensation regime that will apply at any given point in time. Compensation paradigms that are subject to political or other non-economic influences, that may be modified whenever a particular special interest believes that such revisions may improve its financial or competition position, serve only to introduce additional uncertainty into a market environment that is already beset with high risk and disappointing results, and in so doing will work to the benefit of the incumbents by impairing entrants' ability to attract and raise capital.

Unfortunately, and as we address in greater detail in the sections that follow, the process by which intercarrier compensation arrangements for the interchange of local traffic have thus far been established — and which seems to be dictating the agenda for the current policy debate — is anything but reflective of these principles.

2 | INTERCARRIER COMPENSATION: FROM THE *ACT* TO THE PRESENT

The present reciprocal compensation mechanism was dictated by ILECs based upon their assessments as to the ability of entrants to compete

The controversy over the treatment of intercarrier compensation stems largely from the fact that CLEC/ILEC traffic flows are often out of balance, sometimes significantly so. Where the compensation mechanism involves explicit cash payments by the originating carrier to the terminating carrier for handed-off traffic, a net traffic flow from the ILEC to the CLEC would require that the former make monetary payments to the latter for its work in terminating ILEC-originated calls.

CLECs have been singularly unsuccessful in attracting, serving and retaining large numbers of Plain Old Telephone Service ("POTS") customers — particularly in the residential segment. Five years since the enactment of the federal *Telecommunications Act of 1996*, ILECs nationally retain in excess of 96% of the residential and small business local exchange service market.[30] New capital investment in CLEC ventures has all but disappeared, and CLEC share prices have plummeted (see Table 1).

There are a number of explanations for this condition, but much of the blame lies directly with the incumbent carriers, who have been particularly uncooperative in pursuing the various measures required by Sections 251 and 252 of the *Act* that would make their

30. See *Trends in Telephone Service 2000 - 2nd Report*, FCC Industry Analysis Division of the Common Carrier Bureau, (Released December 2000), Table 9.2, at 9-5. Dividing the number of the ILEC Residential & Small Business for June 2000 by the total number of Residential & Small Business for June 2000 (i.e., 140,486,770/(140,486,770 + 4,597,807) = 96.8%.

various network resources available to CLECs on a seamless and economically viable basis.[31] It is thus hardly surprising that the overwhelming majority of local calls will necessarily be originated by *ILEC* customers over *ILEC* local network facilities. Consequently, the vast majority of calls that are terminated by a given CLEC to its end-user customers will necessarily have come from an ILEC. For those CLECs that have specialized in serving customers with high inward calling volumes (such as voice mail providers, call centers, and Internet service providers ("ISPs")), most of the traffic they handle will thus involve an intercarrier hand-off, and will necessarily result in a large traffic imbalance in the CLEC's favor. Consequently, the intercarrier compensation payment by the ILEC may be substantial.

Reciprocal compensation payments for terminating traffic are properly viewed as "competitive losses" — rather than as "costs" — to the originating LEC.

ILECs typically portray their reciprocal compensation payments to CLECs for the termination of inbound traffic originated by ILEC end users as representing *revenue losses* that would be avoided if traffic between the ILEC and CLEC were more nearly equal in volume ("balanced") in both directions. The same could, of course, be said of *any* competitive loss (if a firm in any industry doesn't lose business to a competitor, its revenues would obviously be higher), but this truism is — or at least should be — entirely immaterial in terms of the policy question at issue here. ILEC intransigence has foreclosed CLECs from successfully competing in the "POTS" market. CLECs have thus been forced to seek out and serve specialized market niches, such as customers with high inward calling requirements. Since most of those inward calls will have come from the ILEC-dominated POTS customer base, most will necessarily involve intercarrier compensation payments flowing from the ILEC to the CLEC. If this is a problem for ILECs, it is also clearly one of their own making.

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31. Underscoring this point, as of the mid-2001, Bell companies had "satisfied" the Section 271(c)(2)(B) "competitive checklist" necessary for long distance market entry in only five states. FCC rulemaking decisions issued in 1996 to implement the *Telecommunications Act* are still, some five years later, under the cloud of court challenges by ILECs. SBC and Verizon have been fined in excess of $40-million for failure to comply with various conditions and requirements relating to interconnection and other transactions with CLECs that had been imposed by the FCC. And even the instant *Intercarrier Compensation NPRM* by its very existence serves to create further uncertainty and further discourage investment in CLEC ventures.

Table 1

CLEC Market Capitalization September 1999- August 2001

Company Name	Market Cap Sept 30, 1999 (millions)	Market Cap Sept 30, 2000 (millions)	Market Cap Aug 8, 2001 (millions)	% Change Sept 1999-Aug 2001
Adelphia	$ 1,439.70	$ 650.16	$ 529.40	-63%
Allegiance	$ 4,086.50	$ 2,512.79	$ 1,550.00	-62%
AT&T Corp	$ 151,592.90	$ 102,286.76	$ 76,400.00	-50%
Commonwealth Telephone	$ 972.87	$ 837.43	$ 993.00	2%
Connectiv	$ 1,712.68	$ 1,585.20	$ 2,010.00	17%
CoreCom	$ 2,679.43	$ 459.16	$ 15.60	-99%
CTC Communications	$ 239.24	$ 538.19	$ 165.20	-31%
CTCI	$ 936.49	$ 756.98	$ 315.20	-66%
Intermedia	$ 1,274.64	$ 1,303.25	$ -	N/A
Focal	$ 1,451.72	$ 1,085.25	$ 102.00	-93%
Global Crossing	$ 21,061.42	$ 28,022.93	$ 5,260.00	-75%
GST Telecomm Inc	$ 265.18	$ 0.63	$ -	N/A
Northpoint	$ 3,044.88	$ 941.58	$ 6.27	-100%
ICG Communications	$ 736.77	$ 22.77	$ -	N/A
Level 3 Communications	$ 17,810.58	$ 28,317.09	$ 1,700.00	-90%
Worldcom	$ 144,541.84	$ 72,623.19	$ 41,270.50	-71%
RCN	$ 3,785.42	$ 1,378.47	$ 364.10	-90%
Sprint	$ 42,597.39	$ 21,148.60	$ 20,200.00	-53%
Winstar Comm Inc	$ 2,145.89	$ 1,429.48	$ 6.19	-100%
XO Comm/Nextel	$ 19,360.84	$ 7,970.99	$ 666.30	-97%
Total CLEC	**$ 421,736.38**	**$ 273,870.88**	**$ 151,553.76**	**-64%**
S&P 500 Index	**$ 1,282.81**	**$ 1,436.51**	**$ 1,190.16**	**-7%**
Dow Jones Industrial Avg.	**$ 2,998.87**	**$ 3,173.96**	**$ 3,110.70**	**4%**

Note: Intermedia was acquired by Worldcom; ICG Comms. filed for Chapter 11 reorganization; and GST Telecomm declared bunkrupcy and its assets were subsequently sold.

Source: Carrier 10Q reports, www.thedigest.com/stocks/

There is, of course, no question but that the loss of call termination business constitutes a *competitive loss* to the incumbent. A careful examination of the circumstances associated with this particular competitive loss will, however, reveal that it resulted from the incumbents' fundamental mis-assessments of the market and their mispricing of services, and is certainly not the "fault" of CLECs who made entirely legitimate market responses to the pricing signals that they were receiving from ILECs.

Call origination and call termination are separable activities each one of which confronts its own set of market conditions. There is nothing in the 1996 federal *Telecommunications Act* nor in any other competitive telecom policy framework that requires that CLECs become mere clones of the incumbents, that the nature and mix of the services they provide precisely mirror those being offered by the ILECs, albeit on a smaller scale. In a competitive local telecom market, carriers can compete for call termination business without having to necessarily compete for the corresponding call origination business. If a CLEC is able to furnish the call termination service more efficiently than the ILEC, the goals of competition are served when customers requiring this service are induced to switch from the ILEC to a CLEC; it would be an extraordinarily unjust and unreasonable, if not also an unlawful policy that would force CLECs who elect to specialize in serving customers with high-volume inward calling requirements to *also* seek out and serve customers with offsetting *outward* calling needs just so as to achieve a "balance" of traffic.[32]

Under a system of explicit reciprocal compensation payments and as long as the ILEC's rates are based upon the ILEC's costs, there is no logical connection between the traffic flow and associated compensation due in one direction, and the traffic flow and compensation that might occur in the reverse direction. Compensation must in each case be paid for the work performed by the terminating carrier and the volume of traffic that may or may not flow in the reverse direction is — or should be — irrelevant.

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32. There can be no dispute that a significant demand exists for one-directional calling, either inward or outward. Specialization aimed at serving such customers should be both *expected* and even encouraged within the framework of a competitive telecommunications policy. This attribute of the market for telecommunications services is entirely analogous to the case of firms that specialize in handling large volumes of paper mail, some of which specialize in *outgoing* mail (direct mail advertising, billing, and order fulfillment, for example) whereas others specialize in *receiving* and dealing with large volumes of *incoming* mail (payment processing, for example). No one would seriously suggest that a "direct mail house" that generates a large volume of outgoing mail should be forced to accept correspondingly large volumes of incoming mail as a condition for its existence, nor would anyone seriously suggest that a firm that receives large volumes of incoming mail, for which it is not required to pay any postage charge (since that will have been paid by the sender) should be forced either to generate correspondingly large volumes of outgoing mail or, alternatively, to pay a fee of some sort to receive the mail addressed to it. Incumbent LECs receive tens of millions of pieces of mail each month containing checks in payment of the ILECs' bills, mail from which the ILEC derives enormous benefit. Yet we are aware of no proposals that would require that ILECs pay the US Postal Service a fee to receive that highly beneficial mail.

When the issue of intercarrier compensation between ILECs and CLECs first arose in the mid-1990s, CLECs generally supported the use of an in-kind payments mechanism known as "bill-and-keep." Bill-and-keep had been the traditional method of compensation for local traffic interchanged between interconnecting ILECs. ILECs, however, at the time had strenuously opposed the use of bill-and-keep for ILEC/CLEC interchanges, and insisted that explicit "reciprocal compensation" cash payments be made by the originating carrier for traffic handed off to the other carrier for termination. For example, in California, Pacific Bell supported the application of explicit reciprocal compensation payments for intercarrier termination of local traffic. In April 1995, Pacific submitted a proposal to the California Public Utilities Commission for a "Competition to the Core" plan for opening its local markets to competitive entry.[33] A key feature of Pacific's proposal at that time was that network interconnection for the exchange of local traffic between carriers would be accompanied by explicit cost-based reciprocal compensation payments:

> New entrants have asked that interconnection arrangements be established for completion of local calls between LECs with appropriate coverage of the costs of the use of each network. The Plan establishes the capability to exchange local calling between customers of two or more local carriers with reciprocal compensation arrangements between the carriers. The price for interconnection will be equal to switched access charges, about 1.4 cents per minute, which is among the lowest in the country. new [sic] entrants should establish their interconnection prices based on their costs.[34]

US West advanced similar arguments in support of reciprocal compensation and in opposition to bill-and-keep. For example, during the course of US West's arbitration of an interconnection agreement with AT&T in Utah, US West witness Laura D. Ford testified that it was US West's position that bill-and-keep should apply only if traffic was balanced within a five percent threshold.[35] Ms. Ford went on to explain:

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33. *See* April 3, 1995 Letter from Pacific Bell Vice President Regulatory, J. A. Gouldner to Calif. PUC President Daniel William Fessler.

34. *Id.*, at 5.

35. *See* Utah PSC Docket No. 96-087-03, Direct Testimony of Laura D. Ford, September 16, 1996, at pages 322, line 11 through page 323, line 3 ("U S WEST does not oppose the waiving of reciprocal call termination charges in a given month should the traffic between U S WEST and AT&T be reasonably balanced. U S WEST supports the Michigan Commission's conclusion that a five percent threshold for determining if traffic is in reasonable balance is an appropriate standard. In the event the five percent threshold is exceeded in a given month, the call termination charges should apply reciprocally -- otherwise, the charges may be waived.").

> Two market realities — that AT&T can choose to serve particular types of customers (e.g., businesses), and that different customers have different patterns of originating and terminating traffic — will generally result in traffic that is out of balance between U S WEST and AT&T. An extreme example of this phenomenon would be a new entrant local exchange carrier who chooses to serve the pay phone market. Such a new entrant local exchange carrier will typically terminate a substantially greater number of calls on U S WEST's switch than U S WEST will terminate on the new entrant local exchange carrier's switch. A bill and keep arrangement applied to such a case would not permit U S WEST to recover the cost of terminating the new entrant local exchange carrier's traffic.[36]

Furthermore, US West's economist in that same proceeding, Dr. Robert G. Harris, expressly characterized bill-and-keep as "economically inefficient":

> The central tenet of economics is that prices play a critically important role in the allocation and distribution of goods and services in a market economy. Bill and keep violates that principle. Unless traffic between two carriers is in balance and/or the cost of terminating that traffic is equal, bill and keep is economically inefficient because carriers and their customers do not pay for the costs they generate from originating calls. *Even if costs are in balance in the short term, bill and keep is economically inefficient because it provides an incentive for carriers to overuse what is essentially a free good — call termination services from the other carrier.*[37]

Of course, in 1996 when this testimony was written, US West apparently believed that it would be called upon to *terminate* more traffic handed-off to it by CLECs than it would be delivering to CLECs for termination (hence the payphone example), i.e., that traffic would be out-of-balance, and that US West would be a *net recipient* of interchanged traffic. The Company's emphatic support for reciprocal compensation and opposition to bill-and-keep are entirely consistent with that business assessment.

As it now turns out, of course, US West's and most other ILECs' business judgments on this point have been proven to be dreadfully wrong. The various reciprocal compensation call termination rates that had been *dictated* by ILECs during the first round of interconnection negotiations and PUC proceedings on this subject were set at large multiples of cost. For example, where Pacific Bell had proposed a 1.4 cent per minute

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36. *Id.*, at 324, lines 2-11.

37. Utah PSC Docket No. 96-087-03, Direct Testimony of Robert G. Harris, September 16, 1996, at 52-53, footnotes omitted, emphasis supplied.

charge, the FCC found the cost to be in the range of 0.2 to 0.4 cents,[38] and recent ILEC call termination rates being dictated in the wake of the large traffic imbalances in the CLECs' favor have been even lower.[39] In setting these high call termination rates, the ILECs obviously expected to be net recipients of reciprocal compensation payments, that is, they expected the traffic imbalance to be in their favor. They clearly underestimated the ability of CLECs — faced with substantially above-cost prices that they could either pay or be paid — to selectively seek out customers with primarily inward calling requirements. The ILECs also underestimated the potential demand for inward calls to ISPs that would be created by the extraordinary growth of the Internet. In assessing the market outcome, ILECs appear to have failed to recognize (a) that call origination and call termination are different services, and (b) that CLECs could be selective in the mix of customers they elected to pursue and to serve.

In dictating the reciprocal compensation rate that would apply for interchanged local traffic, ILECs confronted CLECs with what amounted to a straightforward business decision as to whether the CLECs should be buyers of call termination services from the ILECs, or sellers of call termination services to the ILECs. Because CLECs were faced with much higher reciprocal compensation rates than the CLECs themselves had proposed in negotiations (and which, despite ILEC claims at the time, now appear to have been set decidedly in excess of cost), some CLECs elected to "sell" rather than to "buy" at that price, and solicited customers (including ISPs) with relatively high inward calling requirements. Thus, ILECs lost the opportunity to serve these high-volume call termination customers by mispricing their services. *It would be entirely inappropriate at this time to now engage in what amounts to nothing short of a bail-out of those ILEC errors.* In competitive markets, competitors live or die by their own business judgments and decisions, *and it is not the role of regulators to backstop these market choices by after-the-fact protective measures.*

There was nothing unreasonable or inappropriate about this deliberate attempt on the part of some CLECs to seek out particular types of customers with unusually high inward calling needs and thereby to become net recipients of terminating traffic — and terminating reciprocal compensation payments. In fact, this outcome is fully consistent with the proper functioning of a competitive market. In this instance, the ILEC, as the dominant player in

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38. *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 and Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers*, CC Docket Nos. 96-98 and 95-185, *First Report and Order* (rel. August 8, 1996), at paras. 811-815.

39. Recently, Verizon-Maryland proposed a reciprocal compensation rate for end office termination of 0.144 cents per minute. See Maryland PSC Case 8879, Panel Testimony of Louis D. Minion and Marsha S. Prosini (Verizon-Maryland), May 25, 2001, Attachment A (Reciprocal Compensation: Terminating End Office per MOU, VZ-MD Scenario = $0.00144).

the market, established and held out a price at which it was willing to either *buy* or *sell* call termination service. If a competitor was able to furnish the same service at a lower cost than the price signals it was receiving from the dominant ILEC, both the CLEC and the economy overall are well served by the CLEC pursuing this market opportunity.

In dictating the reciprocal compensation rate, the ILEC was engaging in a form of economic negotiation sometimes described as "I cut, you choose/you cut, I choose." Suppose that Bob and Bill are trying to evenly divide a chocolate cake between them. Under "I cut, you choose," Bob, for example, would cut the cake into what he believed were two equal pieces, and Bill would then have the right to select which piece he would get. Obviously, in such a process, Bob has a powerful incentive to make his slice as close to a 50/50 split as possible since, if the two pieces are unequal, Bill will then have the right to select the larger piece. Note also that under this type of negotiation arrangement, it doesn't actually matter which party does the slicing and which does the choosing, since both would share the identical incentive no matter which role each assumes.

The establishment of a symmetric reciprocal compensation rate by the ILEC that the CLEC is then free to either pay to the ILEC or have the ILEC pay to it should provide the ILEC with precisely the same incentive to "get it right" as Bob has in slicing the chocolate cake. So it is therefore entirely reasonable and correct for CLECs to *assume* that in setting their existing reciprocal compensation rates, ILECs attempted to get as close to their (and their competitors') actual costs as possible, since the risk of being wrong (too high or too low) would necessarily cost these companies money. In fact, ILECs would have deliberately set their price in excess of cost *only if they believed that CLECs would be unable to achieve a net traffic flow in the CLECs' favor.* That error would be in the nature of a bad business judgment which, like other management decisions, firms must live with in competitive market environments. Of course, in the instant situation, it would appear that the ILECs engaged in precisely this market behavior, mistakenly believing that CLECs could not be so selective as to focus disproportionately upon customers with high-volume inward calling requirements.

But what if the ILECs had deliberately overstated their costs and thereby quoted excessive prices for call terminations? In setting their call termination reciprocal compensation rates, the ILECs were well aware that the price each established would apply in both directions, and therefore should have had the incentive to set a price level that was at or very close to the actual costs involved in providing call termination functions. But if, for example, an ILEC had deliberately established an excessive price, that action would necessarily have been driven by an erroneous business judgment as to competitors' ability to be selective in seeking out and serving customers with high inward calling needs. In competitive markets, there are often serious consequences of mispricing one's product or service, and competitors are certainly entitled to take full advantage of the conditions they

confront in developing their business strategies and in defining the market segments that they will serve.

In the instant situation, however, the specific reciprocal compensation rates that had been dictated by the ILECs were proffered as being cost-based; indeed, they were *required* by law and by regulation to be cost-based. Section 252(d)(2) of the *Telecommunications Act of 1996* sets forth the specific relationship between the reciprocal compensation rate and the underlying costs of terminating calls:

> Section 252(d)(2) CHARGES FOR TRANSPORT AND TERMINATION OF TRAFFIC-
>
> (A) IN GENERAL- For the purposes of compliance by an incumbent local exchange carrier with section 251(b)(5), a State commission shall not consider the terms and conditions for reciprocal compensation to be just and reasonable unless—
>
> (i) such terms and conditions provide for the mutual and reciprocal recovery by each carrier of costs associated with the transport and termination on each carrier's network facilities of calls that originate on the network facilities of the other carrier; and
>
> (ii) such terms and conditions determine such costs on the basis of a reasonable approximation of the additional costs of terminating such calls.

In fact, ILECs expressly *represented to regulators* that their reciprocal compensation rates were cost-based. For example, US West's Dr. Harris testified in Utah that US West's proposed rates for transport and call termination "were cost-based and in compliance with the FCC's TELRIC methodology." Harris then went so far as to affirmatively testify that he had personally

> worked with US West in the development and implementation of its economic costing methods and [had] reviewed the US West cost studies that provide the basis for its proposed prices of call termination and transport of interchanged local traffic. The fundamental economic premise of these studies is that the incremental cost of transporting or terminating calls in the long run is caused by the incremental capacity burden imposed on the system by the interchanged traffic. US West has analyzed traffic flows during typical busy hours for switching offices to determine the most technologically efficient means of providing capacity. This forms the basis for the capacity cost analysis, and is consistent with the notion of forward looking costs. Incremental costs of

> billing are also included in US West's cost measures, as is appropriate because these are costs that must be recovered under cost-based pricing.

It was thus entirely reasonable and appropriate, then, for regulators *and for competitors* to rely upon the ILECs' representations with respect to their costs for terminating local traffic. When ILECs attempt to introduce "new" cost studies in support of a changed agenda that produce dramatically different results than those proffered by the very same companies a few years ago, the new results must necessarily be viewed with extreme skepticism.

Even worse, some ILECs are now attempting to manufacture a distinction between traffic that CLECs hand off to them and traffic that they hand off to CLECs, and based thereon to establish *differential* prices whose effect is to eliminate the existing symmetry in the treatment of reciprocal compensation. Specifically, ILECs are seeking to differentiate between the cost associated with traffic that CLECs terminate to them and the cost associated with traffic that they terminate to CLECs.[40] Not surprisingly, the ILECs' new "cost studies" produce dramatically higher values for the former than for the latter. Both of these results purport to be based upon these companies' own costs, but in fact there is substantial reason to expect that, all else being equal, CLEC costs may actually be higher than an ILEC's costs for providing the equivalent call termination service[41] *unless the CLEC is able to develop alternative network architectures and serving arrangements geared specifically to its particular traffic mix.*

Under an explicit reciprocal compensation regime, the appropriate compensation for calls terminated by one of two interconnected carriers is entirely independent from the volume of traffic and associated compensation flowing in the reverse direction. ILECs often portray situations in which traffic flows are significantly out of balance as somehow inconsistent with the intent of opening local markets to competition, and argue that CLECs with heavily-lopsided inbound traffic are somehow taking advantage of a "loophole" in the ILEC's tariff. In a competitive local telecom market, carriers — including the ILECs themselves — are free to compete for call termination business. If a CLEC is able to furnish the call termination service more efficiently than the ILEC, the goals of competition are served when customers are induced to switch from the ILEC to that CLEC for this service.

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40. See, for example, the public version of the "Cost Analysis for Internet-Bound Traffic" which SWBT filed in Texas PUC Docket No. 21982.

41. For example, individual CLECs purchase far less central office switching equipment that does a large ILEC such as Verizon or SBC, and thus commands far less purchasing power in the telecommunications equipment market than most incumbent LECs. As such, CLECs will necessarily pay more than the ILECs for the same equipment, resulting in higher per-unit cost to the CLEC if all that it does is to replicate the ILECs' network architecture and service production strategy.

Payments should compensate each participating carrier for the work each performs in completing calls handed-off to it.

Under a system of explicit reciprocal compensation payments *and as long as the ILEC's rates are based upon the ILEC's costs*, there is no logical connection between the traffic flow and associated compensation due in one direction, and the traffic flow and compensation that might occur in the reverse direction. In fact, if the symmetric reciprocal compensation rate is set *at the ILECs' cost*, then only those CLECs that are able to provide call termination services more efficiently than the ILEC will elect to engage in this particular market segment. On the other hand, inasmuch as the *Telecommunications Act* and resulting FCC regulations *require* that the reciprocal compensation rate be set *at the ILEC's cost*, CLECs acted reasonably in assuming that the rate confronting them in their respective interconnection agreements did in fact represent the ILECs' cost. If the CLEC found that it was able to furnish high-volume call termination services at a lower cost, then it acted legitimately in making the necessary investment in switching and related equipment and in developing a business plan premised on the reciprocal compensation price that was dictated to it by the ILEC. The volume of traffic that may or may not flow in the reverse direction - i.e., from the CLEC to the ILEC, is irrelevant.

There is no technical basis for differentiating carriers that specialize in serving customers with unique traffic properties from those whose customer mix exhibits more typical or "average" properties. Fundamentally, the cost characteristics of local traffic do not depend upon the *content* of the call or the purpose or use motivating the call (e.g., to connect to and transmit data to/from an ISP vs. a voice call to a friend or to a nearby retail or service establishment). The factors affecting the cost of processing a call through an ILEC's local network, or of processing a call from an ILEC's customer to the point of interconnection with a CLEC, depend solely upon the PSTN resources that are utilized by the call — primarily switching and transport — which are affected, to varying degrees, by the call's duration, the number of switching operations involved in processing the call, the distance over which the call travels, and the extent to which the use of these resources affects the carriers' peak-demand capacity at the time that the call is in progress.

For this reason, calls to ISP modem lines that are connected to the PSTN within the calling party's local calling area are technically indistinguishable from "ordinary" end-user to end-user local calls, whether completed entirely on the ILEC's network or involving a hand-off by the ILEC to a CLEC for termination.

There is no difference between the process by which "ordinary" end-user to end-user calls are handled vs. the way in which an end-user-to-ISP call is handled where the call is

originated by an ILEC customer and terminated to a CLEC customer.[42] Routing a call from an originating end user to an ISP's incoming modem line is technically identical to routing a call from the same end user to any local telephone number served by the incumbent or by another LEC. The switch serving the recipient end user's line receives the incoming call on a trunk from another switch (either another end office switch or a tandem switch), identifies the appropriate line to "ring" (i.e., the line on which to signal an incoming call), and then proceeds to generate a ringing signal to the recipient access line. When the incoming call is answered (whether by a person picking up a handset, an answering or fax machine going "off-hook" in response to the ringing signal, or by a modem automatically going "off-hook") the ringing signal is immediately terminated and a direct (circuit-switched) connection between the calling and called parties is established. This same sequence of events takes place when someone in San Francisco or a nearby suburb calls his or her local bank, or places any other local call, *including a call to an ISP whose number is within the originating party's local calling area.* In terms of the use of local network resources, it is also essentially the same thing that happens when an incoming long distance call reaches the switch serving the called customer. On a technical basis, there is no reason to distinguish among any of these types of PSTN traffic. While some ILECs have argued that ISP-bound calls are different because they do not "terminate" at the ISP's modem bank but instead "terminate" somewhere "in" the Internet, the ISP's Internet-related functions beyond the modem at which the call terminates are irrelevant to the definition and treatment of ISP-bound calls.

Where the call is directed to a customer (end user or ISP) served by a CLEC, the originating LEC (typically an ILEC) routes the call from the originating Class 5 end office to a Class 4 tandem office from which it and other calls from other Class 5 end offices that are bound for the same CLEC are aggregated and routed to the CLEC's Point of Interconnection ("POI") with the ILEC. The CLEC then routes the call from the POI through its network to its ISP customer. If the ISP is served directly by the ILEC, calls would be routed either from the originating Class 5 end office to a tandem office, and then to the terminating Class 5 end office from which the ISP's service is furnished, i.e., to which the ISP's access lines are connected, or directly to that end office via a Class 5-to-Class 5 interoffice trunk. Where a high volume of traffic exists between the originating and terminating end offices, the use of direct interoffice trunk routing that bypasses the tandem may in some cases be more efficient. The matter of direct vs. tandem routing is an economic decision for the ILEC to make based upon the volume and variability of the traffic, and the relative costs of direct trunking and tandem switching in each instance.

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42. ILEC contentions in this regard were addressed and rejected by the FCC in the *ISP Remand Order*. As stated therein, "The record developed in response to the *Intercarrier Compensation NPRM* and the *Public Notice* fails to establish any inherent differences between the costs on any one network of delivering a voice call to a local end-user and a data call to an ISP." *Id.*, at para. 90. See also paras. 91-92 (rejecting ILEC arguments for such cost distinctions).

Termination of concentrated inbound traffic, including ISP-bound traffic, requires somewhat different switch engineering than terminating more dispersed (i.e., POTS-like) inbound traffic, and in some cases may be more costly — particularly where the LEC's network is not configured specifically for this type of usage. Specifically, when an end office serves a significant fraction of lines that have a very high volume of inbound calls, the line-to-trunk concentration ratio in the switch must be reduced, meaning that more trunk ports must be in place for each line port. In a typical "POTS" end office serving an ILEC's average traffic mix, the concentration ratio is ordinarily in the range of 6:1 to 4:1, whereas the ratio for a high inbound-calling office may need to be reduced to 2:1 or even 1:1. In some cases, ISPs and other end users with heavy volumes of inbound calling may terminate their lines directly on the trunk-side of the switch. While ISP-bound traffic cannot be identified or segregated *per se*, it is a subset of the class of concentrated inbound traffic, and some CLECs have targeted this general category of traffic as a market niche, and have adopted network designs tailors to accommodate precisely this type of calling.

ILECs have in the past contended that the costs associated with handling concentrated traffic are greater than the costs associated with handling a like volume of dispersed traffic. In the course of lobbying the FCC to eliminate the exemption of enhanced services providers (ESPs)[43] from interstate access charges, several ILECs submitted studies purporting to show that the concentrated nature of ISP-bound traffic has caused them to incur costs incremental to their ordinary call termination costs. In a "Pacific Bell ESP Impact Study" filed with the FCC in July 1996, Pacific claimed that the growth of ESPs had "caused Pacific Bell to incur additional costs to increase network capacity as Pacific has already identified $13.6-million in central office reengineering costs for 1996 associated with providing business lines to ESPs. These costs are over and above the normal growth expenditures associated with comparable quantities of business lines provisioned for typical business customers."[44]

In June 1996, Bell Atlantic filed a study with the FCC that addressed the impacts of increased Internet usage.[45] Similar to Pacific, Bell Atlantic contended that serving ISPs with high levels of inbound calling caused it to incur increased investments in traffic-sensitive facilities to accommodate the termination of that traffic, and specifically concluded

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43. The category of enhanced services providers encompasses Internet service providers and other suppliers of on-line services.

44. Pacific Bell ESP Impact Study, attached to July 2, 1996 Letter from Alan F. Ciamparcaro, Pacific Telesis Vice President, to James D. Schlichting, Chief, FCC Competitive Pricing Division.

45. Report of Bell Atlantic on Internet Traffic, attached to June 28, 1996 Letter from Joseph J. Mulieri, Bell Atlantic Director — FCC Relations, to James D. Schlichting, Chief, FCC Competitive Pricing Division ("BA Internet Usage Study").

that "the network elements most affected by heavy traffic loads from ISPs are line units, switch modules and interoffice trunking."[46]

While some aspects of these studies are flawed,[47] they nevertheless provide some evidence that ILECs' avoided costs for termination of concentrated traffic, including ISP-bound traffic, are actually *higher* than a rate based solely upon an ILEC's forward-looking economic cost for terminating all traffic (both concentrated and relatively dispersed traffic). ILECs have argued that the longer average call durations for ISP-bound calls causes those calls to have a *lower-than-average* per-minute cost, because the costs of the switching set-up function are recovered over more minutes per call. However, these two sets of arguments do not square with one another. In any event, if call set-up were a significant cost element, this matter could be easily addressed in the reciprocal compensation rate structure. While the ILEC-dictated reciprocal compensation rates have almost universally ignored call set-up as a rate element, there is no particular reason why this cost component, if it is consequential at all, could not be captured in a separate call set-up reciprocal compensation charge that, like the per-minute rate, would apply symmetrically in both directions. In fact, Pacific Bell's approved TELRIC-based prices for unbundled switch usage make precisely such a distinction.[48]

Conclusion

Competition should promote innovation and specialization, and should reward entrants for adopting techniques and technologies that improve the overall efficiency with which services are provided and offered in the market. There is no inherent reason why individual competitive carriers should not be permitted to identify and serve market segments whose traffic and usage characteristics differ from "average" market-wide conditions. There is also no reason why entrants who are able to reduce the costs of satisfying a particular type of service demand should be penalized for such innovations by, for example, being required to provide interconnection/call termination services to ILECs at less than the price that ILECs impose upon them for similar functions.

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46. *Id.*, at 14.

47. In particular, the Pacific and Bell Atlantic studies, as well as similar studies prepared in the same timeframe by US West, NYNEX, and BellCore, failed to perform proper comparisons of the total revenues and costs associated with increased ESP/Internet usage, and thus did not substantiate their claims that the ESP exemption should be discontinued. See Selwyn, L. and Laszlo, J., "The Effect of Internet Use on the Nation's Telephone Network," Internet Access Coalition, January 22, 1997, at 35-49.

48. Calif PUC Decision (D.)99-11-050, November 18, 1999, Appendix A ("Summary of Unbundled Network Element Recurring Prices"), page 2.

3 | THE FALLACY OF BILL-AND-KEEP

"Bill-and-Keep" is not *reciprocal* compensation unless traffic is in balance

Over the past several years, many state regulatory commissions have been called upon to wrestle with the issue of finding the best financial mechanism for intercarrier compensation on locally-rated calls, including ISP-bound calls, in the context of ILEC/ CLEC arbitration cases and generic proceedings. The FCC has indicated a strong interest in bill-and-keep, at least with respect to ISP-bound traffic, as reflected in the *ISP Remand Order*[49] and in the *Intercarrier Compensation NPRM*.[50] In the following two chapters, we discuss some of the possible alternatives to explicit reciprocal compensation available to the FCC and state regulators. In brief, these include:

- *"Bill and keep"* — under this model, interconnecting LECs would compensate each other "in kind" by agreeing to terminate each other's calls without explicit charge or, where traffic is out-of-balance, each carrier would look to its own end user customers, rather than to each other, for compensation.[51]

- *Imbalanced traffic thresholds and adjustment mechanisms* — these devices generally limit the amount of reciprocal compensation paid by one LEC to another,

49. *ISP Remand Order*, at paras. 6 and 71-76.

50. *Intercarrier Compensation NPRM*, at paras. 4 and 66-77.

51. *Id.*, at para. 9.

based upon the degree to which their interchanged traffic within a given time interval is out of balance.[52]

- *The "access charge" model* — this model would treat locally-rated calls that are handed off to a LEC for termination to an ISP like traditional long distance calls, with the ISP placed in the role of the interexchange carrier. Under this view, the LEC serving an ISP would impose usage-based (e.g., per-minute) switched access (or equivalent) charges on the ISP to cover the costs of termination, and would not receive any reciprocal compensation from the originating LEC.

In this section, we examine the "bill-and-keep" approach in detail. The *Intercarrier Compensation NPRM* in several places cites arguments recently advanced by the FCC's Office of Plans and Policies ("OPP") in support of this compensation mechanism. In section 4, we look at several other proposals that have been supported by incumbent LECs. Bill-and-keep is a device for "reciprocal" compensation only if the flow of traffic between the two interconnecting carriers is roughly in balance, because in that circumstance it provides for roughly equal *in-kind* compensation. As we shall demonstrate, each of these alternative compensation arrangements fails to meet the basic economic and policy criteria applicable to intercarrier compensation in that all fail to establish payment and pricing mechanisms that accurately track the costs each of the interconnecting carriers confronts in terminating calls handed-off to it, and in that failure produces an unfair, anticompetitive, and economically inefficient compensation mechanism.

The new interest in "Bill-and-Keep"

While initially *opposing* the bill-and-keep method of intercarrier compensation when they expected that ILEC/CLEC traffic flows would be out-of-balance and in their favor, ILECs have now reversed their earlier position in light of the ensuing market response to ILEC-dictated above-cost reciprocal compensation rates, and now affirmatively push for adoption of bill-and-keep.

From the standpoint of CLECs that have elected to specialize in serving customers with disproportionate inward calling requirements, bill-and-keep is a euphemism for setting the reciprocal compensation rate at zero, a rate that is unambiguously below the costs that the CLEC will incur in terminating ILEC-originated calls handed off to it. To overcome this obvious flaw in the bill-and-keep approach, several efforts have been made in recent months by proponents of bill-and-keep to craft an economic rationale for this compensation (or non-

52. See, e.g., *ISP Remand Order*, at para. 79, which discusses state regulatory commissions that have adopted such mechanisms to limit reciprocal compensation for ISP-bound traffic.

compensation) mechanism, and the *Intercarrier Compensation NPRM* seems to have been influenced by these efforts. Of particular note, the FCC's Office of Plans and Policy ("OPP") in December 2000 issued two staff working papers on this subject.[53] As a general matter, the OPP papers conclude that some form of "bill-and-keep" arrangement is the optimal solution for intercarrier compensation and, of perhaps even greater significant, for the pricing of services provided at retail to end users. However, the papers take different approaches to analyzing the interconnection issue, and ultimately endorse distinctly different incarnations of bill-and-keep. Neither paper, however, provides a compelling, economically sound rationale for bill-and-keep as opposed to reciprocal compensation and, upon closer examination, both papers' support for bill-and-keep rests upon assumptions and concepts that are both unsupported and are likely not valid.

In brief, the DeGraba paper focuses upon the existing interconnection regimes applying to local voice traffic, ISP-bound traffic, and toll calling, and finds all of them to be problematic. Mr. DeGraba proposes as an alternative a device he refers to as "Central Office Bill and Keep" (COBAK). Under COBAK, each LEC would terminate calls on a bill-and-keep basis, except that the calling party's network would be responsible for the cost of transporting the call to the called party's central office.[54] COBAK is suggested as a default regime, to be applied by regulators whenever carriers cannot agree upon other interconnection arrangements.

The Atkinson/Barnekov paper attempts to develop a simplified model of network interconnection, and thereby deduce the most efficient practice for interconnection pricing. The authors describe a scheme they call "Bill Access to Subscribers, (Incremental) Interconnection Costs Split" (BASICS). Under BASICS, which the authors put forth as representing an "optimal" compensation arrangement, call termination would also be performed on a bill-and-keep basis, but with two exceptions: Interconnecting carriers would split equally the costs specific to interconnection *per se* (e.g., the costs of the interconnection trunks between the two LECs' switches), and a LEC connecting with a dominant carrier (an ILEC) would pay the costs of transporting traffic from its subscribers into the ILEC's local calling area.[55]

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53. DeGraba, Patrick, *Bill-and-Keep at the Central Office as the Efficient Interconnection Regime*, OPP Working Paper No. 33 (December 2000) ("DeGraba"); Atkinson, Jay M. and Christopher C. Barnekov, *A Competitively Neutral Approach to Network Interconnection*, OPP Working Paper No. 34 (December 2000) ("Atkinson/Barnekov").

54. DeGraba paper, at para. 24.

55. Atkinson/Barnekov paper, at paras. 39-40, 69-73. They propose that the rule concerning transport cost recovery should be a default that is applied only when carriers cannot agree on another means to allocate those costs.

The authors of those two papers have set a highly ambitious goal, i.e., to design an optimal interconnection regime "from the ground up" that could eventually apply to all traffic exchanged between carriers. Unfortunately, they have over-reached, and both papers fall far short of providing a convincing demonstration that their alternative interconnection proposals would be any more efficient or effective than the current arrangements, i.e., reciprocal compensation arrangements for locally-rated traffic (including ISP-bound calls) and switched/special access arrangements for toll traffic. However, even if the theoretical basis for the authors' conclusions were valid, the paradigm they describe would require a comprehensive and coordinated implementation extending to the pricing of *all* retail end user services, local and "long distance," interstate and intrastate, that goes far beyond the matter of intercarrier compensation. Indeed, taking the OPP papers' conclusions at their face value, the papers would clearly not support the extraordinarily limited, highly targeted (i.e., to ILEC-CLEC traffic interchange) "solution" that the *Intercarrier Compensation NPRM* proposes.

The papers' principal weaknesses fall in four key areas:

(1) Neither paper recognizes the intrinsic linkage between the method adopted for intercarrier compensation and the retail prices paid by end users, which causes their analyses to be fundamentally incomplete.

(2) The two papers share certain assumptions concerning the allocation of the benefits and costs of a call between the calling and called parties, which are unsupported and are most likely wrong as an empirical matter.

(3) The papers inconsistently combine theoretical and pragmatic considerations to support their concrete proposals for how interconnection should be priced.

(4) The papers give undue deference to existing architectures and practices of ILECs, in effect requiring entrants to accept what amounts to a "take-it-or-leave-it" set of interconnection conditions, such as existing ILEC local calling area definitions and the premise that inward and outward traffic that is out-of-balance is to be discouraged.

The following discussion addresses each of these problems in detail.

The analyses advanced in the two OPP papers are fundamentally incomplete, because they fail to consider the impacts that their proposed intercarrier bill-and-keep regimes would have upon the charges applied to end users.

The DeGraba paper focuses upon the issue of how the responsibility for the costs of interconnection between networks should be assigned to the interconnecting networks. DeGraba bases his proposed solution upon an analysis of the distribution of the benefits of a call between the calling party and the call recipient,[56] as we shall explore in depth below. Curiously, however, he stops short of examining the implications of his intercarrier compensation proposal for those very end users — i.e., the consequences that adopting the COBAK proposal would have for retail pricing. Indeed, DeGraba emphasizes that COBAK "does *not* specify how retail rates should be set,"[57] and he suggests that COBAK could be compatible with a variety of retail pricing arrangements.[58]

The Atkinson/Barnekov paper advances a second argument in support of a bill-and-keep rule, but based instead upon a theoretical construct that attempts to focus solely upon inter-carrier compensation without specific consideration as to how their construct will affect charges that will be applied to end users. Atkinson and Barnekov appear to recognize that the latter approach represents a departure from mainstream analysis of interconnection issues, noting that "until fairly recently, the primary focus of interconnection policy has been the distribution of costs among end users, and the literature has focused on end user pricing."[59] Nevertheless, the authors contend that it is possible (and indeed, preferable) to reform intercarrier compensation arrangements for interconnection first, and only after "getting intercarrier compensation right," turn to the issue of conforming end user charges to the new interconnection regime.[60]

It is important at the outset to recognize the limitations that are inherent in any analysis of intercarrier compensation that does not also consider the ramifications that a given intercarrier compensation plan will have upon carriers' pricing of services to their end users. In reality, there are inescapable, intrinsic connections between intercarrier compensation and end user pricing. The first linkage is that end users' consumption decisions drive the level

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56. DeGraba, at paras. 49-55.

57. *Id.*, at para. 31.

58. *Id.*, at para. 32.

59. Atkinson/Barnekov, at para. 5.

60. *Id.*, at para. 14.

of demand for facilities on the interconnected networks. Consider two interconnected networks, Network A serving a subscriber who originates a call, and Network B serving another subscriber whom he wishes to reach. In that case, demand for facilities on Network B, as well as the interconnection facilities between them, is created entirely by the first subscriber's decision to place a call to the customer of Network B. Thus there is no independent demand for interconnection facilities, rather their use is a function of end user demand characteristics. The second linkage is that in any sustainable system, ultimately all of the costs of the complete service, including its interconnection component, must be recovered via revenues generated from end users. From this standpoint, even if any of the OPP papers' authors had made a convincing case that the compensation scheme they support is the ideal, maximally-efficient mechanism for intercarrier compensation (which we do not believe to be the case), such an analysis would be fundamentally incomplete, because they have not shown that it will lead to efficient end user pricing. Moreover, as we explain below, adopting a bill-and-keep approach to intercarrier compensation would require fundamental changes in the traditional retail pricing arrangements for local exchange service, for all carriers and all customers, that are entirely unaddressed by the OPP papers, but are likely to present state regulators with extraordinary difficulties.

In fact, if markets are truly competitive and are not subject to regulatory pricing constraints or price-setting behavior by a dominant incumbent, end user prices might well come to reflect the structure for intercarrier payments. Atkinson and Barnekov themselves implicitly acknowledge this when they point out that interexchange carriers (IXCs) are prohibited by law and FCC policy to pass through the access charges incurred on particular calls to those end users, and instead must apply uniform end user rates that reflect an average of the varying access charges that they confront.[61] Obviously, such an explicit prohibition is necessary because the natural tendency in an unregulated, competitive market would be to pass-through access cost differences in a de-averaged manner. In the same way, imposition of a bill-and-keep system for intercarrier compensation will, unless barred by regulatory fiat, eventually create pressures on all LECs to charge their end users directly for all access engendered by their lines, i.e., inbound as well as outbound usage. Thus, the traditional system of "sent-paid" end user pricing for local calling would likely be replaced over time by a "half-call" system, in which calling parties would pay only for call origination (the first half of the call), and called parties would pay to *receive* calls directed to them (the second half of the call); this type of retail pricing arrangement is illustrated in Figure 4. Regulating this outcome out of existence would not work either under competitive market conditions, because like any regulatory requirement that traffic flows be in balance, such a policy would force entrants to adopt business models that foreclose market specialization and pricing innovation.

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61. *Id.*, at para. 10.

BILL – AND – KEEP

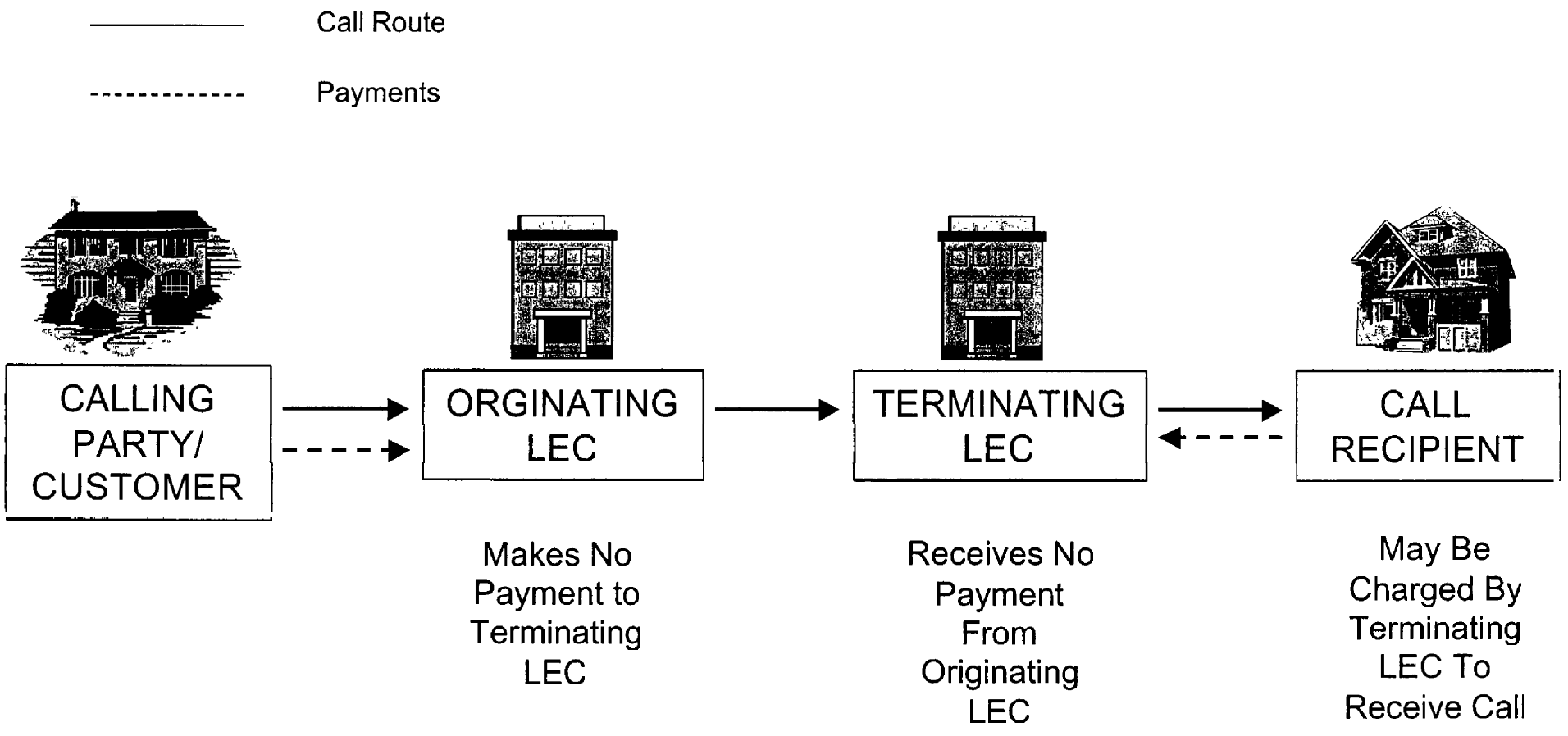

Figure 4. Call Routing and Flow of Payment Under Bill-And-Keep

Whether or not that scenario ultimately occurs, it is indisputable that the prevailing retail pricing regime of sent-paid local calling would be immediately incompatible with adoption of intercarrier bill-and-keep, and would have to be abandoned entirely — for local calls served end-to-end by a single LEC, as well as those exchanged between interconnected LECs. It is easy to see why this is so for local calls handed off to another LEC for completion: sent-paid pricing bills the originating caller for delivery of the call (as well as origination), so that termination costs would be recovered twice-over, once by the originating LEC, and again by the terminating LEC. Any delay in reforming LECs' local exchange tariffs to separate out cost recovery for the inward versus the outward halves of a call would cause the ILECs to receive a windfall of revenues, as they would continue to receive revenues from their originating callers to cover the costs of calls that are handed off to another LEC for termination. Furthermore, it would be infeasible to try to maintain a sent-paid tariff for local calls handled end-to-end by the same LEC, and at the same time shift to a half-call tariff for the calls handed off for termination, because that approach would be administratively complex and expensive to implement, and confusing to end users.

The *Intercarrier Compensation NPRM* appears to lose sight of these problems. Initially, the *NPRM* states that the FCC is "particularly interested in identifying a unified approach to intercarrier compensation — one that would apply to interconnection arrangements between all types of carriers interconnecting with the local telephone network, and to all types of traffic passing over the local telephone network."[62] Indeed, to the extent the FCC seeks to rely upon the theoretical underpinnings for bill-and-keep advanced by the two OPP papers, it would have to move to such a unified mechanism, as both the DeGraba and Atkinson/Barnekov proposals assume the widest possible application of their respective bill-and-keep variations.[63] However, the NPRM's only concrete proposal in this regard is to apply bill-and-keep to specifically to ISP-bound calls exchanged between carriers, thereby creating a "carve-out" of that category of locally-rated calls for radically different treatment than other local exchange traffic.[64]

There is a parable (the source of which is Professor Alfred Kahn, former Chairman of the New York Public Service Commission) about a debate that once took place in the Irish Parliament about converting from driving on the left (as in the UK) to driving on the right (as in the rest of Europe and in the US). The debate raged on, until one back-bencher, in an attempt at compromise, suggested that the conversion be done on a transitional basis, starting only with trucks.

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62. *Intercarrier Compensation NPRM*, at para. 2.

63. DeGraba, at para. 3; Atkinson/Barnekov at paras. 8 and 85.

64. *Intercarrier Compensation NPRM*, at para. 66.

Proposals, such as those apparently being advanced in the *Intercarrier Compensation NPRM*, for a partial transition to bill-and-keep or "shared responsibility" pricing will lead to an outcome that is no less chaotic. CLECs that serve ISPs would be forced either to look to their ISP clients for payment for terminating traffic or otherwise to exit that market segment; ILECs, on the other hand, will continue to be compensated by their end user "POTS" customers through traditional sent-paid pricing, and will thus be in a position to regain control of this segment. Where the CLEC does look to its ISP client for payment, the ISP will in turn be forced to flow through such payments to its own subscribers in the form of higher monthly charges or perhaps even usage-sensitive charges for Internet access, but those same users will have paid their ILEC, under the sent-paid pricing regime applicable to POTS services, for the *entire* end-to-end call. So in addition to creating a disparity as between ILECs and CLECs with respect to call termination services being furnished to ISPs, implementation of the *Intercarrier Compensation NPRM*'s proposed rule would also result in a double charge to many end users, forcing them to pay their originating ILEC for the full end-to-end call, and to pay their ISP once again for the portion of the call from the ILEC/CLEC hand-off point to the ISP.

Even if the FCC wanted to avoid these kinds of disruptive consequences of a partial adoption of bill-and-keep, it would be beyond its statutory powers to do so. While the *Act* has blurred some of the traditional jurisdictional boundaries between the FCC and state regulators (relative to pricing guidelines for unbundled network elements, for example), it remains the case that *local* retail structures, rate levels, and local calling areas in all cases fall squarely within the purview of the state PUCs. Accordingly, the FCC could not, within the *Intercarrier Compensation* rulemaking, achieve a comprehensive outcome unilaterally.

As a general matter, any attempt to comprehensively align retail local exchange tariffs to a bill-and-keep intercarrier compensation mechanism would create a massive regulatory burden for state public utility commissions (PUCs), who have jurisdiction over those tariffs. Each state PUC would be compelled to craft, for every LEC operating in its state, separate retail rate structures for the recovery of the originating and terminating portions of local exchange calls. This would necessarily include, among other things, the introduction of new *end user charges* to replace payments that at present apply only between interconnecting carriers. The majority of ILECs operate under some form of price regulation today, and some would no doubt seize upon a regulatory mandate to alter their tariffs in such a fundamental way as the basis for an upward "exogenous adjustment" to price caps imposed on their local service rates. Indeed, it would be very difficult for regulators to determine whether the resulting tariffs would be revenue-neutral or disguise a rate increase for end users, particularly if flat-rated services were replaced by measured usage rates. At the very least, because of the enormous and largely unexamined consequences that intercarrier bill-and-keep would have for retail local service pricing, the FCC could not undertake to adopt a bill-and-keep mechanism without also involving state regulators (e.g., via the Federal-State Joint Board) in its evaluation.

The OPP papers rely upon a flawed treatment of the allocation of benefits and costs of a telephone call between the subscriber who places the call and the called party.

Under traditional bill-and-keep arrangements, the carrier that terminates calls handed off to it receives zero *monetary* compensation for the work involved in handling such traffic, but is nevertheless "compensated" for that work on an "in-kind" basis, because the interconnecting carrier will similarly terminate originating traffic without an explicit charge. Where the traffic flows are significantly out-of-balance, the "in-kind" aspect of bill-and-keep is not present, and the uncompensated carrier would presumably decline to accept such traffic absent some other form of compensation. ILECs, of course, have argued that such compensation should come from the call recipient - specifically (with respect to ISP-bound traffic), from the ISP. But those arguments are premised upon the demonstrably false notion that ISPs are themselves telecommunications carriers and thus should be afforded the same treatment as is given to IXCs — i.e., access charges. As discussed above, in the new versions of "bill-and-keep" proposed by the OPP authors, the traditional "sent-paid" method of charging customers for the calls they originate would have to be replaced by a shared responsibility arrangement under which the calling and called parties would each pay a portion of the total charge for the end-to-end connection — whether the call involves an intercarrier interchange of traffic or is handled end-to-end by one carrier. CLECs serving ISPs, for example, would no longer receive reciprocal compensation payments from ILECs for terminating ISP-bound traffic, and would have to look to their ISP customers for payment for this service.

A fundamental premise of both the DeGraba and Atkinson/Barnekov approaches is that it no longer makes sense to consider a call as being "caused" by one telephone subscriber attempting to communicate with another subscriber. Instead, both papers posit that the responsibility for — and benefits from — a telephone call — indeed, from *any* telephone call (i.e., not just those to an ISP) - are shared between the calling and the called parties. Atkinson and Barnekov declare (again, without any empirical basis) that "the entire concept of the 'directionality' of a call is rapidly becoming highly ambiguous, if not entirely meaningless."[65] Similarly, DeGraba argues that the cost of occupying a telephone circuit through the public switched telephone network (PSTN) "is the same for a network whether the call is originated by its end-user customer or received by its end-user customer."[66] Moreover, DeGraba eventually concludes that the most expedient assumption with respect to

65. Atkinson/Barnekov, at para. 11, footnote 21.

66. DeGraba, at para. 53. This statement is, of course, likely true, but is also entirely irrelevant. The fact that the called party's network incurs costs to terminate a call originated by someone else does not make the called party the cost causer, a critically important point that DeGraba appears to entirely ignore.

the allocation of the *benefits* of a telephone call is to posit that "on average, the called party and the calling party share equally in the benefit of a call."[67] While these points may at first appear to be somewhat esoteric, the assumptions of "equal responsibility" and "equal benefit" are in fact central to the entire rationale for the two papers' bill-and-keep proposals.

The assumption here is that the LEC serving the *called* party can recover its costs of terminating the call via a charge imposed upon the call recipient. Presumably, if both the calling and called parties share equally in the benefits arising from the call, then both should be willing to share in its cost. Note that this theory, if valid, would require not only that the called party's network look to its own customer, rather than to the calling party's carrier, for compensation (i.e., bill-and-keep), it would *also* require that at the *retail level* the charge for receiving an incoming call be assessed on the called party *whether or not more than one carrier is involved in handling the end-to-end call.* Obviously, of course, if the benefits of telephone calls generally are not shared equally, then a compensation and retail pricing paradigm predicated thereon would simply create new inefficiencies not present under the existing sent-paid regime.[68] If, contrary to this "equal benefits" assumption, benefits typically *do* inure disproportionately to the calling party, then imposition of a charge for incoming calls will suppress demand, because calls will not be answered whenever the called party would perceive the cost of doing so to exceed the benefit that would be realized.[69]

This "equal benefits" theory is critical to the authors' conclusions. Significantly, however, the requirement that the "shared responsibility" be flowed through to the retail end user customer is distinctly not present in the *Intercarrier Compensation NPRM* proposed adoption of a bill-and-keep intercarrier compensation regime *except for the limited case of ISP-bound calls.*[70] As discussed in the preceding section of this paper, there is an intrinsic linkage between the form of intercarrier compensation adopted and end user pricing; thus, the allocation of cost responsibility between the originating and terminating carriers for

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67. DeGraba, at paras. 53 and 55 (footnotes omitted).

68. In common with the authors, I am assuming that pricing does affect subscribers' consumption decisions, because otherwise no efficiency gains could be realized by altering that pricing.

69. For those calls where benefits inure disproportionately to the called party, the existing rate structure permits a called party to elect toll-free (reverse-charge) 800-type service.

70. The *Intercarrier Compensation NPRM* proposes to adopt bill-and-keep for ISP-bound calls (para. 66), and the FCC is apparently willing to do so (in line with the decisions already made in the *ISP Remand Order* to transition to a presumed bill-and-keep system for ISP-bound traffic) even if it is not adopted for local voice traffic (see paras. 69-77).

purposes of intercarrier compensation will be *extended to the retail pricing level* as well, and this fundamental departure from "sent-paid" pricing must apply for *all calls*, not just for those requiring an intercarrier hand-off for completion. Significantly, and as we discuss further below, the paradigm contemplated in the *Intercarrier Compensation NPRM* falls far short of such a comprehensive pricing reform.

But the threshold question here is, are the "equal responsibility" and "equal benefit" assumptions underlying the OPP analyses reasonable? To begin with, neither paper offers any proof, empirical or otherwise, that supports these propositions. DeGraba himself acknowledges that prior economic analyses in this area have "tended to assume that the calling party was the sole cost-causer and sole beneficiary of the call."[71] There is, in fact, substantial reason to expect that, for sent-paid (i.e., for non-800-type) calls, the calling party derives considerably more benefit than the call recipient (and, conversely, for 800-type calls, the recipient derives more benefit than the caller). Consider the following characteristics of a typical telephone call:

- The calling party affirmatively selects the person to be called and the time at which the call will be placed;
- The calling party knows who is being called, the nature/subject/purpose of the call, and how much the call will cost;
- The called party does not choose the time for the call, prior to picking up the handset does not know who is calling, does not know the nature/subject/purpose of the call and, depending upon how terminating use is to be charged (e.g., possibly at a different rate for local vs. long distance, intrastate vs. interstate calls), does not know how much answering the call will cost;
- Not every originating call attempt is answered by the called party; where a busy or no-answer condition arises, the called party receives zero benefit (the calling party, on the other hand, receives information as to the fact that the called party is either not home or on the phone, and hence does receive some positive benefit from the call attempt);
- Customers can currently elect to voluntarily pay for incoming calls (800-type services) where the call recipient expects to derive sufficient value from the call as to justify the payment *and* where there is some likelihood that if required to be placed on a sent-paid basis, a significant percentage of the calls would not be made. Thus, even if *on average* benefits were to be divided equally across all

71. DeGraba, at para. 50.

calls, those for which the called party has elected to pay (i.e., where the called party derives disproportionate benefit) would have the effect of leaving in the universe of sent-paid calls those that disproportionately benefit the calling party;

- Where a customer does agree to pay for the 800-type call, the 800-service customer will, prior to answering a given call, nevertheless have a reasonable idea as to who is calling, the nature/subject/purpose of the call, and how much answering the call will cost.

Taken together, these factors strongly suggest that the benefits of a telephone call are *not* typically shared equally between the calling party and the called party, on average or otherwise.

A second fundamental error underlying the foundations of both the DeGraba and Atkinson/Barnekov models is that they broadly assume that efficient pricing requires that responsibility for payment for a call track the flow of benefits from the call[72] - i.e., if the benefits are shared equally between calling and called parties, the total charge for the end-to-end call should similarly be shared on that same basis. The theory that responsibility for payment must track the allocation of benefits is also highly questionable and is likely to be incorrect in the context of interconnection policy. Even if benefits are shared (equally or in some other proportion) between the calling and called parties, there is no "efficiency" requirement in economic theory for spreading payment responsibility in the same proportion as relative benefits. It is theoretically correct that efficient pricing requires that externalities be internalized through pricing. However, the relative importance of such a policy depends critically upon whether the failure to do so materially affects consumption and whether the cost of implementation (transaction costs) would exceed the incremental efficiency gain in consumption.

In this case, the authors have failed to supply any evidence that the demand for call originations is being suppressed due to the requirement that the calling party pay for the entire call (except for the special case of 800-type calls, where the call recipient has affirmatively elected to pay the entire charge for the incoming call). Moreover, both papers ignore entirely all transaction costs associated with implementation of the authors' proposals. Such transaction costs could be substantial and would likely overwhelm any incremental efficiency gains that might be generated by adopting either of these interconnection proposals.

72. For example, see DeGraba at paras. 57-62.

Both papers inconsistently combine theoretical and pragmatic considerations to support their concrete proposals for interconnection pricing.

Both papers place a great deal of emphasis upon developing a theoretical rationale for splitting the costs of a call evenly between the networks serving the calling and the called parties. However, as we have noted, rules advanced in both papers make an exception when it comes to recovering the costs of call transport. The DeGraba paper explicitly proposes to extend this concept to interexchange traffic, as it would require the originator of a toll call to pay for originating switched access as well as for all of the interexchange transport.[73] If there is some theoretical basis for a 50/50 split of the cost of a call, then there is no basis for requiring that the originating customer (or carrier) pay for the entire cost of transport. The entire rationale for this inconsistency appears to be pragmatic, i.e., the authors recognize the extreme difficulty of splitting the cost of transport between originating and terminating parties or of resolving perverse incentives faced by the originating carrier with respect to its location and the location of the meet-point. For example, DeGraba observes (para. 68) that "... 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 costs as possible onto the latter network." Unfortunately, by fashioning a cost recovery rule for transport that ostensibly addresses these pragmatic issues, DeGraba severely undercuts the theoretical justification for the bill-and-keep treatment that he proposes for call termination costs.

Atkinson/Barnekov take an entirely different approach to the treatment of transport costs but, like DeGraba, do not contemplate anything close to a 50/50 split. Where DeGraba would have the *originating* carrier provide and pay for transport to the terminating carrier's central office (which means that, for ILEC-originated/CLEC-terminated ISP-bound traffic, the *ILEC* would be required to provide and pay for transport all the way to the CLEC's central office), Atkinson/Barnekov would force the CLEC to pay for transport between its physical premises and the local calling area from which the call was originated.[74]

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73. DeGraba, at para. 80.

74. DeGraba is unclear on the matter of transport beyond the ILEC's local calling area. Where the call involves an IXC in addition to the originating and terminating LEC, COBAK requires that the calling party's LEC be responsible for delivering the call to the IXC's POP, and that the IXC be responsible for delivering the call to the called party's central office. DeGraba does not discuss the case of an intraLATA "interexchange" call where the calling party is not located within the same local calling area as the CLEC serving the called party. If it is his intention that the calling party pay the originating LEC for the interexchange transport portion *as if it were being carried by an IXC*, then his proposal is essentially the same as the Atkinson/Barnekov construct. See DeGraba, at 10.

Moreover, because the two papers ignore all transaction costs and transactional inefficiencies, they are selective and inconsistent in the manner in which they substitute pragmatism for economic theory. The same pragmatic rationales raised in the papers would also apply just as easily to proposals to (for example) charge the end user directly for traffic-sensitive originating and terminating switched access, because transaction costs would easily overwhelm whatever "efficiency gain" such pricing might engender.

The papers give undue deference to existing architectures and practices of ILECs, in effect requiring entrants to accept what amounts to a "take-it-or-leave-it" set of interconnection conditions, such as existing ILEC local calling area definitions and the premise that inward and outward traffic that is out-of-balance is to be discouraged.

Both the DeGraba and Atkinson/Barnekov interconnection/compensation models afford disproportionate deference to the ILEC networks, traffic patterns, and tariff structures as they presently exist, and in so doing would confront entrants with what amounts to a "take-it-or-leave-it" situation. Both the *Telecommunications Act*[75] and FCC rules[76] affirmatively permit CLECs to (a) specify the location of their points of interconnection with ILECs, and (b) interconnect with the ILEC at any technically feasible point within the ILEC's network. Nowhere is there any requirement that an CLEC maintain more than a single point of interconnection in any one LATA.

Nevertheless, Atkinson/Barnekov would explicitly require the CLEC to pay for transport between its POI and *each* of the ILEC's local calling areas or, in the alternative, to establish a POI in each such local calling area.[77] Although not stated in those terms, DeGraba's construct essentially imposes the same requirement for CLECs' outward calls to ILEC end users, by conferring responsibility for all transport up to the called party's ILEC

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75. Section 251(c)(2) of the *Act* obligates ILECs to interconnect with CLECs at any technically feasible point on the ILEC's network "(A) for the transmission and routing of telephone exchange service and exchange access; (B) at any technically feasible point within the carrier's network; (C) that is at least equal in quality to that provided by the local exchange carrier to itself or to any subsidiary, affiliate, or any other party to which the carrier provides interconnection; and (D) on rates, terms, and conditions that are just, reasonable, and nondiscriminatory ..."; there is no requirement for CLECs to connect at more than one point.

76. Rule 51.305(a)(2) states that a CLEC need establish only one (1) point of interconnection ("POI") with an ILEC at any technically feasible point *anywhere* in each LATA. This principle was most recently restated in the *Intercarrier Compensation NPRM*, at para. 72.

77. Atkinson/Barnekov, at paras. 70-71.

central office upon the CLEC.[78] The "local calling area" is, in fact, an artifact of *ILEC* pricing strategies that has its roots in an era in which costs were highly sensitive to distance and long distance calls were expressly used as a source of subsidy support for the basic exchange access line. *There is no basis for subordinating interconnection policy or CLEC competitive opportunities to ILEC local calling area structures.*

A "local calling area" generally consists of one or more individual "exchanges" (sometimes referred to as "rate centers") to which customers may place calls without a toll charge ("outward local calling area") or from which customers may receive incoming calls without the calling party being subject to a toll charge for such calls ("inward local calling area"). An "exchange" or "rate center" is an administrative definition of a geographic area within which all customers receive identical rating and rate treatment with respect to both outgoing and incoming calls. In non-metropolitan areas, an exchange usually corresponds to the area served by a single "wire center" or central office switch (although in rural areas a single switch may serve more than one exchange). In metropolitan areas, an "exchange" may include an area served by more than one "wire center" or central office switch.

"Outward local calling areas" and "inward local calling areas" are not always the same. A customer in exchange "A" may be able to call customers in exchanges "B," "C," "D" and "E" on a local call basis (i.e., without a toll charge) but the outward local calling area for exchange "D," for example, might not necessarily include exchange "A." In that circumstance, a customer in "A" could call a customer in "D" without paying a toll charge, but a customer in "D" calling a customer in "A" would be subject to a toll charge for the call. Thus, in this example, the outward local calling area for exchange "A" would be more extensive than its inward local calling area.

Traditionally, local calling areas have consisted of the subscriber's "home" exchange, adjacent (contiguous) exchanges and, in some cases, nearby exchanges that are not contiguous with the calling party's exchange. However, that situation is currently undergoing substantial changes. For example, wireless carriers typically offer a larger local calling area than their wireline counterparts and, in some instances, include the entire United States within the wireless subscriber's local calling area, and CLECs may compete directly with the ILEC and with each other by offering customers local calling areas that differ from that being offered by the ILEC. In fact, the extent of the local calling area is itself becoming something that some CLECs see as an opportunity to differentiate their products from those being offered by the ILEC. A CLEC might, for example, offer its customers a larger local calling area than that being offered by the ILEC as a means for attracting customers or, alternatively, might choose to offer a *smaller* local calling area than the ILEC's service provides, at a correspondingly lower price. ILECs themselves are also

78. DeGraba, at para. 25.

changing the definition of "local calling area" by introducing optional calling plans that provide for extended area local calling including, in some cases, all exchanges within the subscriber's LATA.

It is entirely appropriate for competing carriers to adopt local calling area definitions that differ from those of the ILEC. One of the primary public policy goals of introducing competition into the local telecommunications market has been specifically to encourage and stimulate innovation in the nature of the services that are being offered. CLECs should not be limited to competing solely with respect to *price*, nor should they be expected to become mere "clones" of the ILEC with respect to the services they offer. For example, a CLEC might offer a local service "package" that includes one or more vertical service features, such as call waiting, three-way calling, and/or caller ID, features that ILECs typically offer separately from the dial tone access line, at often substantial additional charge. Newer wireless (PCS) carriers, competing against the incumbent 800 mHz cellular service providers, began to offer such feature bundles almost from the outset of their operations, frequently forcing the incumbent cellular carriers to mimic their service offerings with similar "packages" of their own.[79] Prior to the entry of PCS competition, cellular carriers offered very limited local calling areas (often replicating precisely the local calling area defined by the ILEC for the exchange in which a particular cell phone was rated), and also imposed high "roaming" charges for outward calls that were originated outside of the customers "home" service territory (even where the call was originated from another service territory controlled by the same cellular carrier). As PCS carriers came into the market, they began to offer extended, sometimes *nationwide*, local calling, and have also introduced calling plans that eliminate most or all roaming charges. *There is every reason to expect that as competition develops in the wireline local service market similar types of local calling area expansions will be offered*, and the fact that incumbent LECs do not presently bundle vertical features and expanded local calling into their basic local service is itself evidence of the absence of effective competition in the local service market as it exists today.

Unfortunately, CLECs that attempt to define local calling areas that differ from those established by the ILEC will often encounter a variety of roadblocks — particularly with respect to their *inward* local calling area. Proposals in the OPP papers that would further subordinate CLEC local calling areas to those as defined by ILECs serves only to undermine the CLECs' opportunities to develop and introducing innovating services and pricing plans. Mechanically, with respect to *outward* calls (i.e., calls originated by the CLEC's own customers over a CLEC dial tone access line), the CLEC can include any

79. AT&T Wireless Services and Sprint PCS, for example, typically include Call Waiting, Three-Way Calling, Call Forwarding, Caller ID, and Voice Mail as integral parts of their wireless service offerings, at no additional charge.

given rate center for local call treatment merely by designating all of the NPA-NXX codes associated with that rate center within the appropriate routing and billing reference tables (databases). So even if the ILEC's local calling area for exchange "A" is limited to include only exchanges "A," "B" and "C," the CLEC could add "D" and "E" to *its customers'* outward local calling areas simply by inserting the NPA-NXX codes assigned to "D" and "E" as "local calls" in its rating tables. In the case of incoming calls, the local calling area applicable to the *calling party* (who we can assume is most likely to be an ILEC customer) will necessarily govern the rate treatment for the call. Whereas the CLEC may choose to include rate centers "D" and "E" within the *outward* local calling area for "A," the *ILEC* may not include "A" within the outward local calling areas for "D" or "E," thus making calls by its customers in those two exchanges to customers in rate center "A" — whether served by the ILEC or by a CLEC — subject to toll rate treatment.

These existing difficulties would be exacerbated if the ILEC local calling area definitions are used to establish responsibility for transport costs in the case of ILEC/CLEC interconnections. The significant decrease in the cost of telephone usage, coupled with the elimination of distance as a cost driver, makes the "local calling area" and the resulting local/toll distinctions largely obsolete. The persistence of small local calling area in today's and tomorrow's telecommunications market is thus an *anachronism*, a holdover from the distant past that is neither required nor appropriate in the modern telecommunications market environment.

In addition to the papers' acceptance of *ILEC-defined* local calling areas as a given, they also appear to be predisposed to the notion that there is something inherently valid about "balanced" traffic flows and something inherently wrong with imbalanced originating and terminating traffic. The present system of explicit reciprocal compensation payments fully addresses and deals with the potential for traffic imbalance: If one carrier receives more traffic to the other than it delivers in return, it will be compensated for its work in completing the imbalanced traffic. If the reciprocal compensation rate is properly set at the ILEC's cost of terminating local calls on its own network, then the ILEC should be entirely indifferent as to whether it or another carrier completes any given call to any given end-user ("ordinary person" or "ISP"). CLECs will accept such reciprocal compensation payments for out-of-balance traffic only to the extent that they are able to furnish the service at a lower cost than the ILEC; a CLEC that operates less efficiently (i.e., at higher cost) than the ILEC *would be unwilling to terminate ILEC-delivered calls at a reciprocal compensation rate based upon the ILEC's costs.* Under the sent-paid pricing arrangement that applies for virtually all local calls, the originating caller will have paid for the entire end-to-end call in any event, and is entitled to have the call carried to its intended destination without the recipient being required to pay any bounty to receive the incoming call.

Neither of the OPP papers provides any compelling basis for abandoning the existing sent-paid/reciprocal compensation paradigm in favor of any of the interconnection

mechanisms that they propose. More seriously, neither paper considers the various consequences of their proposals on CLEC incentives and responses thereto.

Our overall conclusion is that neither the DeGraba paper nor the Atkinson/Barnekov analysis afford a sound economic or policy basis for regulators to impose "bill-and-keep" arrangements as the preferred solution for intercarrier compensation on ISP-bound calls and other locally-rated traffic.

4 OTHER INTERCARRIER COMPENSATION ARRANGEMENTS

In this section, we examine two other proposals for modifying the reciprocal compensation practice that have been put forth as methods of limiting the ILECs' financial exposure where they have lost call termination business to CLECs.

Traffic Imbalance Thresholds and Related Payments Limitations

Some states have adopted so-called "traffic imbalance adjustments" under which reciprocal compensation payments may be reduced for traffic exceeding a pre-defined ratio of terminating to originating hand-offs. In a proceeding last year that established permanent rates to apply for intercarrier compensation between Southwestern Bell Telephone Company (SWBT) and about twenty CLECs, the Texas Public Utility Commission determined that a "tandem blended rate" (i.e., an average of end office switching rates and generally higher tandem-related rates) should apply to traffic terminated by a LEC that does not have two-tier or hierarchical switches; however, if the ratio of terminating to originating traffic exceeds 3:1, then only the (lower) end office rate is applied irrespective of the CLEC's switching architecture, unless the CLEC can prove that it is providing tandem functionality.[80] The New York PSC has adopted a similar rebuttable presumption that traffic in excess of a 3:1 ratio is "convergent" (including, but not limited to, ISP-bound traffic) and thus should qualify only for compensation at the lower end office termination rate.[81] Following the states' lead, the FCC's *ISP Remand Order* establishes a rebuttable presumption that terminating traffic that exceeds a 3:1 ratio vis-a-vis originating traffic is

80. Texas PUC Docket No. 21982, *Re: Proceeding to Examine Reciprocal Compensation Pursuant to Section 252 of the Federal Telecommunications Act of 1996*, Arbitration Award, July 12, 2000, at page 37

81. New York PSC Case No. 99-C-0529, Opinion No. 99-10, August 26, 1999, at pages 59-60.

ISP-bound, and would deny the terminating carrier reciprocal compensation for completing such calls.[82]

While a device of this sort will certainly work to limit the potential extent of ILEC reciprocal compensation payments to CLECs, it is entirely devoid of any sound economic justification. As we have explained, under an explicit reciprocal compensation regime, the appropriate compensation for calls terminated by one of two interconnected carriers is entirely independent from and unrelated to the volume of traffic and associated compensation flowing in the reverse direction. Such "traffic imbalance adjustments" are *per se* discriminatory against those carriers that have elected to specialize in serving customers with high inbound calling requirements, and as such are neither necessary nor appropriate, and should not be adopted by regulators.

In addition to presupposing an entirely undeserved validity to the notion that traffic imbalances are somehow to be discouraged, compensation arrangements such as these work to create perverse incentives for the CLECs that are affected by them. Consider the following example. Suppose that a particular CLEC terminates 100-million minutes per year and originates only 5-million minutes, resulting in a 20:1 termination:origination ratio. Under the 3:1 threshold adopted in the *ISP Remand Order*, roughly 85-million terminating minutes would go effectively uncompensated. However, the CLEC could remedy this situation by increasing the number of minutes that it originates and sends to the ILEC. The CLEC could avoid altogether the penalty reciprocal compensation rate by increasing its *outgoing* traffic from 5-million minutes to 33.3-million. From the CLEC's perspective, the price it would in effect be required to "pay" to the ILEC for these terminations would actually be *negative*, because by adding 28.8-million additional outgoing minutes it would be paid the full reciprocal compensation rate for an additional 85-million minutes that it *terminates*. The CLEC would thus be in a position to offer virtually free outgoing service to its customers, because by so doing it will be able to increase its *incoming* call revenues.

Compensation arrangements that have this effect are on their face inefficient and uneconomic. Indeed, bill-and-keep generally will confront CLECs with a similar set of incentives: Whereas the CLECs today are said to have an incentive to seek out and serve customers with high inward calling volumes, under bill-and-keep these same carriers would acquire instead an incentive to seek out and serve customers with high outward calling volumes, because these calls will then be terminated by the ILEC at no charge to the CLEC. The only way to truly "get it right" is to adopt a cost-based reciprocal compensation rate structure that makes ILECs indifferent as to whether they or competing carriers complete ILEC-originated calls, and that rewards CLECs only and to the extent that they are more efficient at providing call termination services than are the ILECs.

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82. *ISP Remand Order*, at para. 79.

The "Access Charge" Model

Several ILEC-sponsored economists and other ILEC witnesses have proposed that ISP-bound traffic is sufficiently different in nature from other forms of locally-rated traffic that it should be subject to entirely different compensation arrangements. In particular, they contend that ISPs function in a manner that is closely analogous to interexchange carriers, and that their service is "like" interstate long distance service — so that the carrier-to-carrier compensation arrangements should be fashioned after traditional switched access treatment.

For example, Dr. William E. Taylor has testified on behalf of Qwest (which now controls the former US West local operating companies) that:

> based on the cost causation principle, the economically most efficient compensation mechanism for Internet-bound traffic is payment by an ISP (whose customer is the LEC subscriber that seeks Internet access) of usage-based charges, analogous to carrier switched access charges, to all the LECs involved in carrying the Internet-bound call through the circuit-switched network."[83]

Similarly, Professor Robert G. Harris has presented testimony on behalf of several SBC operating companies (Southwestern Bell Telephone (SWBT) and Pacific Bell) that purports to show, on the basis of analyses of cost-causation and contract relationships, that:

> The ISP should compensate Pacific Bell (and the CLEC) for the use of their services just as the ISP compensates Internet backbone service providers such as UUNet, BBN, or PSINet for the use of their services. The IXC arrangement is closely analogous and serves as a guide.[84]

Before turning to consider the pros and cons of the economic arguments advanced in support of the "access charge" model, one must recognize at the outset that there has been a compelling policy argument for applying explicit reciprocal compensation to ISP-bound calls. From 1983 to the present day, the FCC has expressly *exempted* such calling from interstate switched access charges, requiring that calls to ISPs be treated and rated as local

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83. Utah PSC Docket No. 00-999-05, Direct Testimony of Dr. William E. Taylor on behalf of Qwest Corporation, February 2, 2001, at page 4, lines 36-40.

84. California PUC Docket No. I.00-02-005, Testimony of Robert G. Harris on Behalf of Pacific Bell, July 14, 2000 (hereafter, "Harris (Pacific Bell) Testimony"), at page 20, lines 7-10. See also Texas PUC Docket No. 21982, Direct Testimony of Dr. Robert G. Harris, March 17, 2000, at pages 6-7.

calls and that access line services furnished to ISPs be provided as local business exchange service lines out of the local exchange tariff, and this so-called "ESP" exemption has been reconsidered and reaffirmed by the FCC on several occasions over the intervening years.[85] This circumstance means that, regardless of the jurisdictional status of ISP-bound traffic or the potential economic ramifications of such treatment, as a matter of pricing policy the FCC has chosen the sent-paid, local exchange service model for locally-rated ISP-bound calls. As a consequence, from a policy standpoint, for state regulators the only rational choice is to adhere to that same model. Any other compensation alternative would create an untenable mismatch between the sent-paid form of compensation applied to the end user-carrier financial relationship, and the financial relationships between carriers. And because the sent-paid model requires that the originating carrier must pay the terminating carrier compensation for the latter's work in terminating the sent-paid call, reciprocal compensation arrangements must continue to be applied to all locally-rated ISP-bound calls that are terminated by CLECs.

Notwithstanding that basic objection, the economic arguments that have been advanced to support an application of the "access charge model" to ISP-bound traffic are fatally flawed in their own right.

Prof. Harris' theory[86] starts from the premise that there is an explicit or implied contract (in economic terms) between an ISP and its customers, and thereby concludes that the ISP is responsible in an economic sense for all of the costs that its customers generate when they use their telephone to connect to the ISP. As expressed by Prof. Harris, "it is the fulfillment of the ISP's contract with its Internet subscriber that is the immediate cause of additional costs for both Pacific Bell and the CLEC connected to the ISP."[87] Prof. Harris accepts the notion that the person who places a local call in order to reach an ISP is the cost-causer relative to that telephone call,[88] but nevertheless concludes that it is not economically efficient for the costs of that call to be recovered directly by the ILEC serving

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85. See *MTS and WATS Market Structure*, Memorandum Opinion and Order, Docket No. 78-72, 97 FCC 2d 682, 711-22 (1983) (Access Charge Reconsideration Order); *Amendments of Part 69 of the Commission's Rules Relating to Enhanced Services Providers*, CC Docket No. 87-215, Order, 3 FCC Rcd 2631 (1988) (ESP Exemption Order); *Access Charge Reform, Price Cap Performance Review for Local Exchange Carriers, Transport Rate Structure and Pricing, and End User Common Line Charges*, CC Docket No. 96-262, 94-1 et al, First Report and Order, 12 FCC Rcd 15982 (1997) at paras. 341-348.

86. Dr. Taylor advances essentially the same line of argument as Prof. Harris, and thus is also rebutted by the analysis set forth in this section.

87. Harris (Pacific Bell) Testimony, at 7, lines 7-9.

88. *Id.*, at 7, lines 4-5.

that person,[89] as they would ordinarily be for any other sort of local telephone call. Instead, he surmises that in the ISP case, economic efficiency requires that the "party acting on behalf of the cost-causer" — which he identifies as the ISP — must recover the costs of that telephone call from the caller, and then compensate the ILEC with whom the caller placed the call.[90]

Acceptance of this conclusion requires a myopic and ultimately erroneous view of the customer relationships extant between individuals placing telephone calls, their serving LEC, and the called party (i.e., an ISP, other business, a friend, etc.). Here, the caller is seen as *the originating LEC's customer* when the he places a local call to a friend or a non-ISP business (irrespective of whether another LEC is involved), but that same caller is *not* the customer of the originating LEC when the call is a long distance call or a call to an ISP. The assumption here seems to be that an end user cannot be a customer of more than one entity at a time, and that it is somehow necessary to have a *single* party acting on behalf of the cost-causer, who must handle all billing and compensation arrangements for all of the services utilized by an end user.

The basic question at issue here is who is whose "customer" under various scenarios (e.g., when someone uses a telephone to call a friend, a non-ISP business, an ISP, or to make a long distance call). One way of looking at the question of who is whose 'customer' is to look simply at who pays who for what. From this perspective, when an end user makes a long distance call, the end user is the 'customer' of the IXC (to whom it pays all per-minute charges associated with the call). From this perspective, although the end user actually makes use of the originating LEC's switching and transmission facilities (and the switching and transmission facilities of the terminating LEC as well), the end user is neither the originating nor terminating LEC's customer for purposes of this call. On this level (trivial from an economic perspective), who is whose 'customer' is simply a matter of regulatory fiat. Moreover, Section 201(a) of the 1934 *Communications Act* expressly states that the FCC generally can decide who pays whom in cases where multiple carriers collaborate to provide an interstate service -- referred to in the statute as a 'through route.' This illustrates why this 'who pays who' perspective is not helpful in sorting out the economics of the situation.

It can help to analyze customer relationships from an economic standpoint. From an economic perspective, what matters in assessing who is the ultimate "customer" in a multi-party transaction are familiar principles of cost causation. An end user making a call causes the costs associated with that call and, ultimately (except in situations where a subsidy has

89. *Id.*, at 13, lines 14-19.

90. *Id.*

purposely been built into the system) should pay those costs. As a result, from an economic perspective, the end user making a call that involves multiple carriers is the customer of all of the carriers involved in getting the call to its intended destination. Now, for various practical or other reasons, the customer may not write separate checks to each of the entities involved. To the contrary, the more common practice is for the customer to pay only one of the carriers, who then becomes responsible, directly or indirectly, for passing money on to the other carriers who are jointly involved in carrying the call to its ultimate destination.

Thus, in economic terms, in all of the cases cited above (calls to a friend, a non-ISP business, an ISP, or a long distance call), the end user is the customer of all the carriers involved, since the end user is originating a call that involves all of their services.

Some economists, including Prof. Harris, attempt to draw distinctions between ISPs and other businesses that deal with customers over the telephone and/or that deliver their services over the telephone. These distinctions do not hold up under closer scrutiny. Prof. Harris first advances the notion that in the case of both the ISP and the IXC, the end user is trying to "get" somewhere else, whereas when the end user calls a local business such as a bank or a pizza parlor, he has "gotten" where he wants to go.[91] However, this is sophistry, not economics. When I make a trip to a business meeting in Washington, D.C. and my flight lands at National Airport, I still need to take a taxi or the Metro to "get" to where I want to go. The airline has no involvement in that decision or in the actual ground transportation service that I engage; in each instance I am a customer of the taxi or the DC Metro, not of the airline, once I get off the plane. The effect of Prof. Harris' presentation is to conflate certain regulatory choices concerning the payments process — choices that had been made on grounds other than economics — with the economic implications of those choices.

Second, Prof. Harris contends that an ISP or an IXC directly utilizes the services of LECs to fulfill its "contract" with its subscriber, but that this does not occur in the case of a local non-ISP business. To illustrate, he states that "a pizza parlor "contracts" with its customers to provide them pizzas and does not use the phone call as part of its fulfillment of its "contract."[92] Prof. Harris is simply wrong, as there are any number of non-ISP businesses and service providers for which the telephone call placed by the end user is an indispensable aspect of their transaction with the end user.

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91. *Id.*, at 15-16.

92. *Id.*, at 16, lines 7-9.

Consider the case of a call answering bureau, to which an ILEC end user subscribes, entirely independently of her local telephone service subscription. There is nothing in the nature of the call answering bureau business that makes it any less efficient for the ILEC to charge the end user directly for local calls placed to the bureau, as the ILEC does for calls to other local businesses.

However, Prof. Harris would apparently argue that, because the end user must place a local call in order to avail itself of the answering bureau's services (and thereby allow the bureau to fulfill its "contract" with that user), the call answering bureau is responsible for the end users' calls into that bureau (e.g., to check for and receive waiting messages), and that it is more efficient for the call answering bureau to charge the end user for those local calls directly, and to then compensate the LEC for the use of its facilities to make those calls. Prof. Harris' logic could also be extended to encompass travel reservations bureaus, weather information bureaus, credit card verification firms, emergency medical lines, and the like — and produce equally nonsensical results.

In reality, an ISP is no different than any other firm that does business over the telephone and/or that delivers its service via the telephone, a point expressly noted in the recent D.C. Circuit Court of Appeals' reversal of the FCC reciprocal compensation order. As the Court stated:

> Even if the difference between ISPs and traditional long-distance carriers is irrelevant for jurisdictional purposes, it appears relevant for purposes of reciprocal compensation. Although ISPs use telecommunications to provide information service, they are not themselves telecommunications providers (as are long-distance carriers).
>
> In this regard an ISP appears, as MCI WorldCom argued, no different from many businesses, such as "pizza delivery firms, travel reservation agencies, credit card verification firms, or taxicab companies," which use a variety of communication services to provide their goods or services to their customers.[93]

Moreover, economic efficiency is in no way impaired by having two separate parties "acting on behalf of the cost-causer," which is precisely the case in an ISP-bound call originated by an ILEC telephone customer and terminated by a CLEC. As Prof. Harris admits, "in many instances the Pacific Bell end-user and Internet subscriber are one and the

93. *Bell Atlantic Telephone Companies v. FCC and U.S.*, U.S. Court of Appeals for the D.C. Circuit, Decided March 24, 2000, No. 99-1094, Consolidated with 99-1095 et al, On Petitions for a Review of a Declaratory Ruling of the Federal Communications Commission, mimeo at 13-14 (footnote omitted).

same person."[94] All this means is that such a person is using two services from two different entities simultaneously. As long as the cost-causer compensates those two entities for the services that they render — which is precisely what occurs today given existing compensation arrangements between an ILEC and its telephone subscribers, and ISPs and their subscribers — there would be no improvement in economic efficiency by merging those two transactions together.[95]

Conclusion

Two other proposals have been advanced to remedy perceived shortcomings in the existing LEC reciprocal compensation system, namely the imposition of traffic imbalance adjustments, and movement to an access charge model for intercarrier compensation for ISP-bound calls. We have shown that neither alternative would promote economic efficiency or otherwise prove superior to existing reciprocal compensation arrangements. While traffic imbalance adjustments certainly have the effect of limiting ILECs' revenue outflows to CLECs that cater to the ISP/high-volume user call termination market, they have no economic justification, fail to allow mutual compensation to take place, and overtly discriminate against those carriers electing to provide specialized local services in a manner antithetical to the *Act*. Similarly, ILEC attempts to persuade regulators to adopt the access charge model for ISP traffic are also devoid of economic foundation and should be rejected.

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94. Harris (Pacific Bell) Testimony, at 7, lines 15-16.

95. One might think that transaction costs would be reduced if there was a single point of contact with the end user which handled billing the end user, but any such cost savings would be offset by the cost of the intercarrier compensation which would then have to occur and would otherwise not be required if the two entities billed the end user separately.

5 | CONCLUSION

In this paper, we have attempted to examine the economic and policy basis for inter-carrier compensation between telecommunications carriers as well as to provide an understanding of the various approaches to this issue, particularly relative to Internet Service Provider (ISP)-bound traffic, which has caused the FCC and other policymakers to consider major changes to the existing mechanisms. This has become a particularly urgent effort in recent months, as the FCC has adopted new rules via its *ISP Remand Order* to transition reciprocal compensation for ISP-bound calls to a potential bill-and-keep regime, and proposes in its ongoing *Intercarrier Compensation NPRM* proceeding to establish bill-and-keep for ISP-bound calls and perhaps for ordinary locally-rated (and eventually toll) calls as well. While our principal findings are explained in more detail in the body of this paper, they can be summarized as follows:

- The perceived "problems" with the existing intercarrier compensation mechanism of explicit reciprocal compensation payments — traffic imbalances and the growth in payments by ILECs to CLECs for termination of ISP-bound calls — are properly viewed as the outcome of exactly the type of competition that the *Telecommunications Act of 1996* and the FCC's *Local Competition Order* was intended to promote, and do not represent market "failures" that must be remedied by further regulatory intervention.

- Despite the recent revival of interest in a bill-and-keep model for intercarrier compensation — which was flatly opposed by ILECs when the issue was first considered in post-*Act* arbitrations and regulatory proceedings to establish reciprocal compensation rates — the economics of bill-and-keep have not changed from the period when the FCC previously concluded that it was reasonable to apply bill-and-keep *only when exchanged traffic was roughly in balance* so that *mutual* compensation would take place.

- Recent attempts to craft a theoretical basis for a wider application of bill-and-keep, in the form of two papers released by the FCC's Office of Plans and Policy (OPP), fail to afford a sound economic or policy basis for regulators to impose "bill-and-keep" arrangements as the preferred solution for intercarrier compensation on ISP-bound calls as well as for other locally-rated traffic. In particular, the OPP papers:

  (1) Fail to recognize the intrinsic linkage between the method adopted for intercarrier compensation and the retail prices paid by end users, which causes their analyses to be fundamentally incomplete.

  (2) Make certain assumptions concerning the allocation of the benefits and costs of a call between the calling and called parties, which are unsupported and are most likely wrong as an empirical matter.

  (3) Inconsistently combine theoretical and pragmatic considerations to support their concrete proposals for how interconnection should be priced.

  (4) Unduly defer to existing architectures and practices of ILECs, in effect requiring entrants to accept what amounts to a "take-it-or-leave-it" set of interconnection conditions, such as existing ILEC local calling area definitions and the premise that inward and outward traffic that is out-of-balance is to be discouraged.

- When evaluated using appropriate criteria, including economic efficiency, competitive neutrality, and impacts upon end users, neither bill-and-keep, nor other options that have been considered for application to ISP-bound traffic, including traffic imbalance thresholds and access charge treatment, would provide a satisfactory alternative to the existing form of reciprocal compensation arrangements.

The current system of explicit reciprocal compensation for interconnecting LECs has generally worked well and in harmony with the pro-competitive policies underlying the *Telecommunications Act of 1996.* As we have shown in this report, when certain CLECs perceived a competitive advantage over ILECs in providing call termination services to ISPs and other high-volume customers, they were able to define that market and successfully meet their customers' needs. In so doing, those CLECs have exerted competitive pressure on the ILECs' interconnection rates generally, exactly as the FCC's policy of establishing symmetrically-applied interconnection rates was intended to do. Cost-based reciprocal compensation, of the form in place today, is the only mechanism that is competitively-neutral, allows all LECs flexibility in defining the market segments they wish to pursue — whether or not the resulting traffic patterns are balanced — and ensures that each LEC will be fully compensated for its work in completing calls. In contrast, bill-and-keep can satisfy

none of those objectives, and would seriously disadvantage CLECs in favor of ILECs in a manner contrary to the *Act*. Consequently, the FCC and other regulators should not adopt mandatory bill-and-keep (but allow it to be negotiated, when two interconnecting carriers agree it is mutually advantageous to do so) for ISP calls or for any other locally-rated traffic. Instead, regulators should focus their efforts on ensuring that the existing reciprocal compensation system for LECs is applied in good faith by all market participants, and allow competition for local telecommunications services to continue to evolve.

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