ORIGINAL

Before the

STATE OF FLORIDA
PUBLIC SERVICE COMMISSION

Global NAPs, Inc., *Complainant,* *versus* BellSouth Telecommunications, Inc. *Defendant*	Docket No. 991220-TP

Rebuttal Testimony

of

FRED GOLDSTEIN

on behalf of

Global NAPs, Inc.

May 1, 2000

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REBUTTAL TESTIMONY

Introduction and Summary

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Fred Goldstein. My business address is at Arthur D. Little Inc., 20 Acorn Park, Cambridge MA 02140. This testimony is prepared on behalf of my client Global NAPs Inc. and does not represent an official position of Arthur D. Little Inc. I am a Manager in Arthur D. Little's Communications and Information Technology unit.

Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS.

A. I have worked in the telecommunications and data network field since 1977, when I joined the consulting firm of Economics and Technology Inc. I was later Telecommunications Manager at Bolt Beranek and Newman Inc., and served as a telecommunications consultant and as a strategic planner for the network products business of Digital Equipment Corp. At Digital, I represented the company at ANSI-accredited standards bodies dealing with ISDN, Frame Relay and Asynchronous Transfer Mode ("ATM") networks, and I received three patents for ATM congestion management and switching. I later became a member of BBN Corp.'s Network Consulting Practice, largely dealing with dial-up Internet Service Provider ("ISP") activities. I now belong to the Arthur D Little practice that deals

with telecommunications and information technology. I am the author of the book, **ISDN IN PERSPECTIVE** (Reading MA: Addison-Wesley, 1992) and have taught courses for Northeastern University and National Technological University. I have previously appeared as an expert witness in regulatory proceedings, regarding ISDN pricing and related issues, in New Jersey and Maryland. I hold a bachelor's degree in Government from Skidmore College..

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS CASE?

A. The purpose of my testimony is twofold. First, I explain as a technical matter why calls to ISPs are indistinguishable from "local" calls, and that even applying the FCC's "end-to-end" test for jurisdiction, a very large majority (greater than 90%) of ISP-bound traffic is both local and intrastate. I do this by adopting and incorporating by reference my recent testimony before this Commission, on this topic, in the complaint case between Global NAPs, Inc. ("Global NAPs") and BellSouth Telecommunications, Inc. ("BellSouth"). Second, I respond to various misstatements and errors contained in the testimony of BellSouth's witness Mr. Varner.

ISP-Bound Calls Are Indistinguishable From Other Locally-Dialed Calls

Q. ARE ISP-BOUND CALLS TECHNICALLY DISTINGUISHABLE FROM OTHER LOCALLY-DIALED CALLS?

A. No, they are not. I addressed this issue in some detail in direct and rebuttal testimony that I recently submitted to this Commission in a complaint case between Global NAPs, Inc. ("Global NAPs") and BellSouth Telecommunications, Inc. ("BellSouth"). Rather than repeat that testimony here, I have attached it as Exhibit 1, and hereby re-adopt it for purposes of this proceeding.

Very briefly, however, my conclusions are (a) that locally-dialed ISP-bound calls are handled as a technical matter, by both the originating LEC (usually the ILEC) and the terminating LEC (sometimes an ALEC), in a manner that is absolutely identical to the manner in which unquestionably "local" calls are handled; (b) that while the differences between the handling of locally-dialed calls and interexchange ("access") calls are not enormous, to the extent that they exist, ISP-bound calls are handled like local calls, not like interexchange calls; and (c) based on the way in which consumers actually use the Internet and the way in which ISPs actually provision their own services and facilities, it is clear that well above 90% of the traffic between an end user and an ISP's premises is just that — traffic between two local premises. Only a very small portion of the traffic typically exchanged between an end user and an ISP consists of signals bound for or coming from a distant web site.

Mr. Varner's Discussion Of Compensation For ISP-Bound Calling Is Misleading And Erroneous.

Q. PLEASE SUMMARIZE YOUR OBJECTIONS TO MR. VARNER'S DISCUSSION OF "ACCESS" SERVICE AS IT RELATES TO ISP-BOUND CALLING.

A. Mr. Varner's discussion confuses a number of complex issues. One question is whether it makes any sense to think of ISP-bound calls as a form of "access" or not. The short answer — which Mr. Varner gets wrong — is "no." Another question is whether it actually matters if it turns out that ISP-bound calls do meet some legal or regulatory definition of "access." Again, the answer is "no." Since 1983 the Federal Communications Commission ("FCC") has treated calls to Enhanced Services Providers ("ESPs"), of which ISPs are the major group, as a form of access subject to a series of special, and unique, rules. The recent decision of the District of Columbia federal appeals court has cast some serious doubt on whether that classification of ISP-bound calls — a species of access subject to special rules — actually comports with the new statutory definition of "exchange access" added to the Communications Act by the Telecommunications Act of 1996. But if these calls are still reasonably classified as "access," all that means is that they are treated like local for economic purposes under the long-standing ESP Exemption.

Q. WHAT DOES "ACCESS" MEAN AND WHY IS THAT SO IMPORTANT?

A. There are basically two relevant definitions of "access." One definition is from the FCC's rules. It was established in the 1980s. Section 69.42(b) of the FCC's rules and regulations provides that "access service" means: "services and facilities provided for the origination or termination of any interstate or foreign telecommunications."

The other definition was added to the Communications Act by the Telecommunications Act of 1996. It provides that "exchange access" means "the offering of access to telephone exchange services or facilities for the purpose of the originate or termination of telephone toll services."

Now, the FCC's regulatory definition is obviously much broader — covering use of the local exchange for "***any*** interstate or foreign telecommunications" than the new statutory definition, which is limited to use of the local exchange for the origination or termination only of "telephone toll service." The D.C. Circuit raised questions about whether an ISP-bound call could reasonably fit into the new statutory definition, since whatever ISPs do, they are not offering "telephone toll services" when they act as ISPs. (I am putting aside here the relatively minor phenomenon of "voice-over-IP" services, which are not generally provided directly by ISPs.) They are providing information services. While the FCC in an unrelated case in December 1999 suggested that there was indeed some "telephone toll

service" involved in what ISPs provide, that ruling is of questionable validity. In any case, if the FCC wants to rely on it in the reciprocal compensation context, it will have to do so in proceedings on remand from the D.C. Circuit.

Mr. Varner does not seriously address this question. Instead, he runs through a number of variations on the theme of "if this is access, it cannot be local subject to reciprocal compensation."

Q. IS THERE ANY VALIDITY TO MR. VARNER'S BASIC CLAIM THAT THERE CAN BE NO RECIPROCAL COMPENSATION FOR "ACCESS" TRAFFIC?

A. No. In fact, Mr. Varner's discussion is entirely beside the point, for three reasons. First, as I demonstrated in my earlier (attached) testimony, well above 90% of the traffic from end users to ISPs does not go beyond the ISP's own equipment, leading to the conclusion that much less than 10% of the traffic is "access" anyway. So even if Mr. Varner is correct that "access traffic gets no recip comp," that conclusion only applies to a tiny fraction of ISP-bound calling.

Second, as Dr. Selwyn has described in detail, the economic effect of the ESP Exemption is that, for all except perhaps formal definitional purposes, ISP-bound calls are treated just like "local" calls. So for whatever proportion of ISP-bound

calls are "access," the result is the same: these calls are to be treated like local calls, so reciprocal compensation should be due.

Third, while I am not a lawyer, one thing is clear from the D.C. Circuit's opinion: the decision about whether reciprocal compensation applies to particular traffic has to be determined by looking at the rules and policies applicable to reciprocal compensation, not those applicable to jurisdiction or even to access. This is as it should be. This Commission can and should ask itself whether treating ISP-bound calls like other local calls for compensation purposes makes sense. My testimony and that of Dr. Selwyn shows that it does. The fact that this traffic might also meet one or another definition of "access" really has nothing to do with the matter at hand.

That said, there are some real problems with Mr. Varner's discussion of this topic, as discussed below.

Q. PLEASE BRIEFLY DESCRIBE THE EVOLUTION OF THE TERM "ACCESS."

A. Most words have more than one meaning. The Oxford English Dictionary has identified over three hundred meanings for the word "run," to cite an extreme case. But here, we are only concerned with a handful of different meanings for the word "access", particularly in context of the phrase "access service".

The problem began innocently enough when the FCC settled MCI's Execunet dispute over two decades ago by the introduction of a new set of interstate tariffs. These were called "Exchange Network Facilities for Interstate Access" (ENFIA). Before then, interstate call revenues were shared with LECs via the Separations and Settlements process, which had not foreseen competition in either the local or long distance sector. ENFIA allowed long-distance carriers to purchase access to and from LEC subscribers on a tariffed basis. This evolved into today's Feature Groups. (The overwhelmingly most common Feature Group used is Feature Group D, plain-old 1+ access for long distance carriers.)

Later, as a consequence of the FCC's 1982 "Pure 2" decision, a new "customer access line charge" was added to individual line bills. This was to recover a portion of the jurisdictionally interstate share of the local loop, dubbed a "customer access line." (At that time, a large portion of interstate loop costs were recovered through the per-minute "carrier common line charge" in switched access rates.) Unfortunately, this became popularly known as the "FCC access charge," as if it were some kind of fee for subscribing to long distance service. But this "access" and ENFIA's "access" are beasts of a different color.

BellSouth cites the FCC's definition of "Access Service" from 47 C.F.R. § 69.2(b) as "..services and facilities provided for the origination or termination of <u>any</u> interstate or foreign *tele*communications." (BellSouth added the underlined

emphasis. I added the italic emphasis.) It then uses this definition to assert that ISP-bound traffic is "access service." However even that definition fails them, because the operative definition of "telecommunications" is different from the legal definition of "communications." (The definitions are at 47 U.S.C. § 153(43) ("telecommunications") and 47 U.S.C. § 153(52) ("wire communication").)

The D.C. Circuit made clear — and a simple consideration of technical reality confirms — that what ISPs provide (when signals go beyond the ISP's premises) is interstate ***communications***, not interstate ***tele***communications. Simply stated, ISPs are businesses that provide information directly and indirectly from the Internet — they are "information services providers" under the statute. (See 47 U.S.C. § 153(20).) IXCs, however, provide "telephone toll service," *i.e.*, plain old long distance service, so connections between end users and IXCs clearly area form of "access" under either the FCC's definition or the narrower statutory definition noted above.

Beyond the mistake of confusing "telecommunications" with "communications," BellSouth's semantic extension confuses ENFIA Feature Groups (the original "access services" provided to IXCs) with the very different service provided by CLECs to ISPs. The FCC, in 1987, considered applying Feature Group rates to calls made to ESPs. It backed off under considerable political pressure, however, and confirmed the permanent status of the "ESP exemption" that had originally

been established in 1983, when the ENFIA Feature Groups were converted to general access service tariffs at the time of the divestiture of the Bell System.

For this reason, at the time of the 1996 Act, no one really believed that dial-up ISP calls were in any meaningful way anything other than *local*. In that sense, the 1996 Act didn't actually change anything about the status of ISP-bound calls. Prior to the Act, the FCC called ISP-bound calls "access," but mandated that they be treated in all economic and practical respects as local calls. After the 1996 Act, that continued, although, as the D.C. Circuit pointed out, the FCC might not even be entitled to call them access any more, either.

What BellSouth is trying to do is to deny that ISP-bound calls are subject to reciprocal compensation, not because denying compensation makes any sense, but only because connections between end users and IXCs — the types of calls originally addressed by ENFIA — are not. But ENFIA-type calls are compensated for entirely differently — the IXC pays — so it makes perfect sense that they would not be subject to reciprocal compensation.

Q. IS BELLSOUTH'S PROPOSED DEFINITION OF "LOCAL TRAFFIC" REASONABLE?

A. Most certainly not. The point of BellSouth's proposed definition is to ensure that ISP-bound traffic, which is in all economic and technical respects local traffic

(and, indeed, is 90+% ***jurisdictionally*** intrastate, not interstate), is ***not*** subject to compensation. It would therefore undo what seems to me to be the clear intention of Congress in the Telecommunication Act of 1996 and the D.C. Circuit's recent interpretation of that Act. Furthermore, it makes an arbitrary and capricious distinction between ISP-bound calls and other local calls, leading to an attempt to "freeload" off of the efforts of CLECs who deliver these calls.

Q. PLEASE DESCRIBE SOME OF YOUR SPECIFIC PROBLEMS WITH BELLSOUTH'S PROPOSED DEFINTION.

A. I will begin by noting a particularly obscure and confusing sentence which BellSouth has inserted. "As further clarification, Local traffic does not include calls that do not transmit information of the user's choosing". What on Earth does that mean? Every telephone call, be it local voice, ISP-bound, or long distance, is bidirectional. Both sides send information to each other. In the obvious case of a phone-to-phone voice telephone call, the two individuals are presumptively free to speak their own mind. (Of course that isn't always the case: Telemarketers are often required to read from a prepared script, and certainly those calls are not of the recipient's choosing.) Is not the recipient of a call one of its users? But even a the caller who originates a voice call may receive information not of their own choosing. They could call someone and receive bad news. They could reach an answering machine. Does anyone actually "choose" to get caught in the Voice Mail Jail that afflicts so many businesses?

I find it hard to imagine what BellSouth is getting at here; and, unfortunately, while sowing confusion with this and other obscure language, Mr. Varner simply claims to be "clarifying" things. There is no basis for including this language or any other part of the amended definition BellSouth proposes.

Q. HOW DOES THE RECENT RULING FROM THE DISTRICT OF COLUMBIA COURT OF APPEALS RULING COMPORT WITH BELLSOUTH'S DESCRIPTION OF THAT RULING?

A. To put it mildly, not well at all. I am truly amazed at the depth and scope of BellSouth's denial of reality on this topic. From my perspective it simply shows that as BellSouth's underlying position becomes less and less tenable with each passing ruling from state and federal courts and regulators, BellSouth has to depart further and further from reality in its efforts to sustain its own anticompetitive and unreasonable point of view.

From my non-legal perspective, the D.C. Circuit's decision is clear and forthright. The Court found that the FCC's attempt to classify ESP-bound calls as non-other was, in context of reciprocal compensation, illogical. The FCC had used an end-to-end analysis of the overall ***communications*** carried across the call. The court did not seem to have a problem with that approach when the question was ultimate regulatory jurisdiction, but here the question was not jurisdiction; it was whether

compensation was required. Because the FCC missed the logical boat on this issue, the court ruled that "the cases it relied on for using this analysis are not on point." Then later, the court said, "[o]nce again however, the mere fact that the ISP originates further telecommunications does not imply that the original telecommunication does not 'terminate' at the ISP." And later yet, "[t]his classification of ESPs [as information services providers who ***use*** telecommunications but do not provide it] is something of an embarrassment to the Commission's present ruling." Finally, the Court ruled, "[b]ecause the Commission has not supplied a real explanation for its decision to treat end-to-end analysis as controlling... we must vacate the ruling and remand the case." Clearly the FCC's vaunted "one-call" analysis did not withstand scrutiny when the question was whether compensation was due for ISP-bound calls.

Q. DID THE COURT HAVE ANYTHING TO DAY ABOUT THE ISSUE OF WHAT CONSTITUTES "ACCESS SERVICE" DISCUSSED ABOVE?

A. Yes. The court stated that "[t]here is an independent ground requiring remand – the fit of the present rule within the governing statute." Here the Court found fault with the simple question of whether a given call is either "telephone exchange service" or "exchange access". The FCC's *Reciprocal Compensation Order* had given ILECs such as BellSouth some wiggle room in creating a third class of calls which were not quite "telephone exchange service" and not quite "exchange access." The Court found fault with that too.

Indeed, the court's ruling seemed to be a polite but firm rebuke, a clear judgement against the FCC's compromise position and even more strongly against the ILECs' position. The judicial phrase "for want of reasoned decision-making" is perhaps not as dramatic as "hanged by the neck until dead", but then rulings that overturn government regulatory action are likely to be worded much more diplomatically than criminal sentences. BellSouth's suggestion that the court "simply puts the burden back on the FCC to provide further documentation or reasoning" is absurd at best. The FCC took its best shot at preserving its long-claimed Interstate jurisdiction over what are clearly local calls, and was soundly rebuked.

Thus, when BellSouth asks, "How has the jurisdiction of ISP traffic been addressed by the FCC," BellSouth is engaging in a lengthy, even hermeneutical, discourse about rulings that have, for the purposes put forth, been rendered nugatory. In other words, it doesn't matter what the FCC had ruled in 1988 or even in December 1999, if it conflicts with the most recent Court of Appeals ruling.

Q. HAD THE COURT RULED DIFFERENTLY, WOULD BELLSOUTH ***THEN*** BE RIGHT ABOUT ISP-BOUND CALLS?

A. No. Even if the Court had flatly held that ISP-bound calls ***were*** a form of "access," BellSouth's arguments would still be wanting. Both on policy grounds

and on financial and technical grounds, ISP-bound calls require compensation, even when delivered by an ALEC to the ISP.

I am not a lawyer and defer to my legally trained colleagues on some of the subtleties of these matters, but I am aware of the Telecommunications Act's obligations. Mr. Varner states at page 12 that "Section 251(b)(5)'s reciprocal compensation duty arises, however, only in the case of local calls." Based on that assertion, by reclassifying ISP-bound calls as something other than "local," they hope to freeload on the efforts and investments of the CLEC industry. But that is not what Section 251(b)(5) is about. The point of Section 251(b)(5) is to enable competition between LECs when an originating LEC gets paid by an end user to carry a call all the way to its destination, but an ALEC actually does some of the work. Because ISP-bound calls are economically and technically the same as local calls — and jurisdictionally basically the same as well, as shown in my earlier (attached) testimony — Section 251(b)(5) should apply. What happened, unfortunately, is that the FCC got a little tangled up in its own underlying definitional scheme regarding "access," leading to the somewhat confused *Reciprocal Compensation Order* and the D.C. Circuit's decision to vacate that order.

Q. WHY DID THE FCC SAY THAT RECIPROCAL COMPENSATION DOES NOT APPLY TO ACCESS-TYPE CALLS?

A. In my view, the reason is obvious. In 1996, the FCC said that reciprocal compensation does not apply to interLATA access traffic because that traffic is compensated for elsewhere. The FCC was simply invoking the Act's clear recognition of the economic *duality* of calls and created exactly two classes of compensation. In the years since Smith vs. Illinois Bell (1927), there has been a clear distinction between local and interstate-toll calls. Since the ENFIA rulings of the late 1970s, there has been a class of "access" calls by which local exchange carriers complete portions of toll calls.

Prior to the existence of local competition, most local exchange carriers who shared a local calling area used "bill-and-keep" as a means of sharing the cost of local calls. Thus in most areas, no cash changed hands for local calls delivered between carriers. For instance, Sprint-United and BellSouth would exchange calls for no charge between Winter Park and Orlando. Bill-and-keep is fine when there is a rough balance of traffic in each direction; even if there were a per-minute charge, it would come out in the wash, so to speak. And one can argue that bill-and-keep is acceptable even where there is some modest imbalance. For instance, independent LECs with suburban exchanges might generate more calls towards the downtown Bell exchanges, because consumers typically call business more than vice-versa. Bill-and-keep there creates a slight subsidy towards the suburban independent, whose average costs are probably higher than those of the Bell.

When the Telecom Act was passed, most ALECs favored bill-and-keep, but most ILECs demanded explicit reciprocal compensation. Indeed the rates that the ILECs demanded were arguably higher than their own costs of delivering their halves of calls, and were frequently, it seems, based on at least one half of, if not all of, their local measured-usage tariff rates. This pattern made it quite hard for ALECs to prosper by selling many outbound local calls. Thus the ALECs did what could be expected, and sought out subscribers with mostly incoming traffic. Since the retail-ISP industry was growing by then at an amazing rate, the ILECs were doing nothing to attract them as subscribers, and the ILECs were indeed complaining that they couldn't handle all of the incoming traffic generated by ISPs, the ALECs built businesses to serve ISPs. It was understood at the time that this traffic was for *all* intents and purposes "local", since the FCC's mid-1980s "modem tax" proposal had been dead for almost a decade. Instead, the so-called "ESP exemption" had operated since 1984 as a way to preserve the FCC's claim of ultimate authority over this traffic, and ISP-bound calls were simply assumed to be local. Until, of course, the ILECs realized that they had cut the cards wrong.

This is all old news, of course, and I need not repeat it again for the Commission. I note, instead, that when two LECs cooperate in delivering a ***toll*** call, creating an ***access*** call that is billed as toll by an IXC, then there is much precedent for sharing these revenues as well.

In this respect, an ***originating*** Access call is different from a local call because it is, in effect, billed collect. The IXC, who is the recipient, pays the originating LEC(s). BellSouth continuously refers to ISP-bound calls as "access", and these are certainly originating calls, yet this fundamental fact about toll access calls does not apply to them. The ISP is ***not*** paying minutes-of-use charges. The FCC is almost certainly ***not*** going to reclassify ISPs as "non-exempt IXCs" and in so doing impose the so-called "modem tax". They have made this clear repeatedly. Thus BellSouth is engaging in word games to mischaracterize ISP-bound calls.

Q. DOES RECIPROCAL COMPENSATION ENCOURAGE COMPETITION, AND DOES PAYING IT FOR ISP-BOUND CALLS HARM COMPETITION, AS BELLSOUTH ASSERTS?

A. Reciprocal compensation, in general, encourages (or at least enables) competition. Paying compensation for ISP-bound calls is completely in accord with this pro-competitive purpose. As has been explained in earlier-filed testimony by Dr. Selwyn (and as BellSouth's witness Mr. Halprin admitted in the recent complaint case), the effect of denying compensation for ISP-bound calls is to deprive ISPs of any meaningful competitive alternatives in the market. BellSouth's counter-argument that requiring payment for ISP-bound calls is somehow anticompetitive is simply nonsense.

Q. DOES THE FACT THAT AN END USER IS AN ISP'S CUSTOMER MEAN THAT NO RECIPROCAL COMPENSATION SHOULD BE PAID?

A. No. This has nothing to do with it. BellSouth states (Varner at 15), "An end user accessing the Internet is a customer of the ISP for that service. The ISP bills the customer separately and when the customer has a problem they call the ISP." This is true in a sense, but only in the sense that anyone using local telephone service to order something is a customer of whomever it is that they call. An end user accessing Domino's Pizza is a customer of Domino's Pizza for that service. Domino's bills the customer separately and when the customer has a problem with the pizza, they call Domino's. Certainly an end user does not call their ISP when their line dies. They call the telephone company. The ISP is simply a number that they dial. They call the ISP when they have a problem with their Internet service, not their telephone service.

It is true that end users are customers of Domino's pizza, customers of ISPs, and customers of IXCs as well (when they make long distance calls). In the case of calls to Domino's and to ISPs, reciprocal compensation applies because the called party is not charged for incoming traffic — to the contrary, calls to those parties are sent paid. In the case of the IXC, reciprocal compensation does not apply, because the IXC ***is*** charged for incoming traffic. It is this simple economic fact that BellSouth's folderol about "access service" is designed to obscure.

Q. IS BELLSOUTH'S CHARACTERIZATION OF ACCESS SERVICE REASONABLE?

A. BellSouth's witness Mr. Varner spends many pages describing how access service works, continuing to define ISP-bound calls as "access" as if the "exemption" applicable to ISPs were merely a minor technicality. This is, as I have noted, a mischaracterization. The "exemption" is total and complete. It means that the call is treated as ***local*** in every sense except the FCC's label. Meet-point billing and IXC originating access charges do not apply; local usage charges (flat rate or measured) do apply. Separations computations treat them as intrastate.

Thus it is absurd when Mr. Varner states (at 18), "The important point is that both IXCs and ISPs receive access service and, although they are charged different prices, the prices they pay are designed to cover the same costs." Calls (originating access) to IXCs are (effectively) ***collect*** and thus the intrastate usage cost is borne by the IXC. Calls to ISPs are ***sent paid*** and thus the intrastate usage cost is borne by the caller. The ISP does ***not*** pay the same originating access charge as the IXC, nor are they supposed to cover the same costs. Mr. Varner then states (at 18), "That cost is the full cost of providing service to them." Again this is wrong; IXCs pay that and more, including cross-subsidy payments intended for social causes. ISPs pay for their connections plus what other local business users pay to receive local calls, which is nothing, because the calls are sent paid.

Likewise, when Mr. Varner denies that BellSouth "cover[s] the cost of originating traffic to ISPs from its end users", he mischaracterizes the flow of money. These calls are ***not*** free. They are billed as local calls. That is what the "ESP exemption" requires. Thus the calls are sent paid, not collect, and ISPs should not, and cannot legally, be charged the cost of collecting traffic from their end users. Certainly if Mr. Varner's argument were true, then there would be no need for ISPs to use as many telephone numbers as they do. One number would be usable statewide or at least LATA-wide, since access calls are not subject to local-calling-area boundaries. But ISP telephone numbers are not treated as LATA-wide local calls; if a caller dials an ISP number that is not local, tolls apply, and local-usage charges also apply. (ISP 800 numbers are the exception that proves the rule. Some ISPs want to offer their customers the convenience of a single nation-wide toll free number. When they do, the ISPs pay per-minute rates for the 800 calls that their end users make. No one would suggest that reciprocal compensation should apply to ISP 800 numbers. Yet Mr. Varner is suggesting that ***all*** calls to ISPs are, in effect, 800 number calls.)

Q. WHAT ABOUT BELLSOUTH'S PROPOSED ALTERNATIVES FOR ALEC COMPENSATION?

A. Dr. Selwyn discusses these in more detail so I will be brief. But it seems to me that BellSouth's options here are reminiscent of the bandit who also provides alternatives: "your money or your life." BellSouth favors option 2 which is "an

inter-carrier revenue sharing compensation arrangement" in which the ISP's revenues for business exchange service from the ISPs are shared with BellSouth! In other words, while Mr. Varner admits that the ALEC has no way of receiving access payments from its ISP ("exempt") customers, they should pay BellSouth a share of imputed access revenues anyway! This makes no more sense than for BellSouth to suggest that Florida's electric utilities pay BellSouth a fee in exchange for placing such a steady resistive load on the electric utilities' systems, or ask the oil companies to pay for the privilege of having their fuel in Bell's trucks.

Having placed this outrage on the table, Mr. Varner then returns with option 3, bill-and-keep. As described above, bill-and-keep doesn't make any sense here because traffic is not in balance. Finally, BellSouth's option 1 simply defers the question. Since BellSouth seems unable to deal with the issue of compensation for ISP-bound calls in any reasonable way, it apparently doesn't want the Commission to deal with it either.

Q. WHAT COMPENSATION RATE SHOULD APPLY FOR ISP-BOUND TRAFFIC?

A. BellSouth suggests that in case the Commission goes against its recommendations and imposes a minute-of-use obligation on its ISP-bound calls, that it be on a different basis than other calls. Again this hinges on their semantic extension of

the term "access;" since this is "exempt access," according to BellSouth, and since long-distance calls are "access," ISP-bound calls cannot be treated as the local calls they are.

Mr. Varner states (at 32), "Access service characteristics were never considered when local rates were established." That much could be true; local service is designed to be compensatory (viewed as a whole) while IXC access service rates are in general highly contributory. Mr. Varner then hops onto the old chestnut about ISP-bound calls being longer than so-called "local" (non-ISP) traffic. This is irrelevant. Traffic-sensitive costs are generally incurred on minutes of use, not calls, and thus most intercarrier compensation is on a per-minute basis. If call duration is such an important factor, then perhaps Bell should renegotiate all reciprocal compensation agreements to be based on a two-element model, a per-call and a per-minute rate. This would be reasonable so long as the costs were properly assigned, and indeed it would reduce the per-minute compensation paid for longer calls. But again, this has nothing to do with the use of the term "access," and does not require that ISP-bound calls be treated differently from other local calls.

Q. IS BELLSOUTH'S END OFFICE SWITCHING RATE APPROPRIATE FOR THIS COMPENSATION?

A. End Office Switching is an access rate component that generally does not include subsidies. If the Commission has deemed $.002 a valid end office switching rate, then this is perhaps a valid ***component*** *of* the reciprocal compensation rate. I do note, however, that it is unreasonable for BellSouth to pay just this rate on calls that it originates, while charging higher fees to ALECs for calls that they must pay BellSouth to terminate. Compensation should be symmetrical. If BellSouth's reciprocal compensation rates were lower, then perhaps there would be more competition for other sectors of the business. On a forward-looking basis, a lower symmetric rate, to be applied to all instances of local *telecommunications* (including ISP-bound calls), is not unreasonable. This can be taken into account when current interconnect agreements expire.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 991220-TP

In the Matter of:
Global NAPS SOUTH, INC.

For Arbitration of Interconnection Rates, Terms and Conditions and Related Relief of Proposed Agreement with BellSouth Telecommunications, Inc. under the Telecommunications Act of 1996

EXHIBIT FG-1
FRED GOLDSTEIN
MAY 1, 2000

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In re: Complaint and/or petition for arbitration by Global NAPs, Inc. for enforcement of Section VI(B) of its interconnection agreement with BellSouth Telecommunications, Inc. and request for relief.	)))))	Docket No. 991267-TP Filed November 24, 1999

TESTIMONY OF FRED R. GOLDSTEIN

ON BEHALF OF GLOBAL NAPS, INC.

Q. **Please state your name, address and qualifications.**

A. My name is Fred R. Goldstein. My business address is at Arthur D. Little, Inc., 20 Acorn Park, Cambridge, MA 02140. This testimony is prepared on behalf of my client, Global NAPs, Inc., and does not represent an official position of Arthur D. Little, Inc. I am a Manager in Arthur D. Little's Communications and Information Technology unit.

I have worked in the telecommunications and data network field since 1977, when I joined the consulting firm of Economics and Technology, Inc. I was later Telecommunications Manager at Bolt Beranek and Newman, Inc. and served as a telecommunications consultant and as a strategic planner for the network products business of Digital Equipment Corp. At Digital, I represented the company at ANSI-accredited standards bodies dealing with ISDN, Frame Relay and Asynchronous Transfer Mode ("ATM") networks, and I received three patents for ATM congestion management and switching. I later became a member of BBN Corp.'s Network Consulting Practice, largely dealing with dial-up Internet Service Provider ("ISP") activities. I now belong to the Arthur D. Little practice that deals with telecommunications and information technology. I am the author of the book, **ISDN In Perspective** (Reading MA: Addison-Wesley, 1992) and have taught courses for Northeastern University and National Technological University. I have previously appeared as an expert witness in regulatory proceedings, regarding

ISDN pricing and related issues, in New Jersey and Maryland. I hold a bachelor's degree in Government from Skidmore College.

Q. **What is the purpose of your testimony here?**

A. I have been asked by Global NAPs to address the technical aspects of ISP-bound calling. I understand that Global NAPs and BellSouth have a dispute about whether ISP-bound calls are to be treated as "local" calls under their existing interconnection agreement. The purpose of my testimony is to explain that ISP-bound calls are, from a technical perspective, "local" calls as opposed to "interexchange" or "toll" calls.

Q. **Please summarize your testimony.**

A. The FCC has stated that ISP-bound calls are jurisdictionally mixed and largely "interstate" in nature. At times, ILECs have been known to try to confuse this legal, jurisdictional conclusion (as to which I express no opinion, not being a lawyer) with a claim that ISP-bound calls are in some practical, technical respect properly viewed as "interexchange" or "long distance" type calls. (They often accompany this claim with a complaint that access charges "should" apply to ISP-bound calls.) The assumption underlying this claim (to the extent that it is not merely legalistic folderol) is that ISPs are, in some practical, technical sense "like"

interexchange carriers ("ISCs"). Any such assumption is quite wrong. In all practical, technical respects, ISPs "look like" end users to the network, and normal end user calls to ISPs "look like" normal local calls to any other end user such as a bank, pizza parlor, school, or government agency.

For these reasons, as a practical, technical matter, parties entering into contracts about how to handle ISP-bound calls would rationally include ISP-bound calls in the category of "local" calls, for the simple reason that, technically speaking, that is what they are. There is no ***technical*** reason to treat such calls either like interexchange calls, or in some "neither fish nor fowl" special category. (I recognize that parties are free to enter into a contract that treats otherwise technically identical calls differently for some non-technical reason. As I under it, however, nothing in the contract at issue here between Global NAPs and BellSouth separately identifies ISP-bound calls for any separate treatment at all.)

Q. **Please describe how ISP-bound calls are handled within local telephone networks.**

A. As a technical matter, ISP-bound calls are indistinguishable from local voice calls. These calls are handled just like any other local calls.

The caller, typically a subscriber of the incumbent local exchange carrier ("ILEC"),

dials a 7 or 10 digit local number. This is normally routed to a destination switch based upon prefix code (NXX). If the ISP being called is a customer of the ILEC, it is handled like any other intra-ILEC local call (*see* below). Where the ISP is a customer of a competitive local exchange carrier ("CLEC"), the routing may be based on NXX as well (*i.e.*, the ISP may have a number out of an NXX that is assigned to the CLEC's switch).

In some cases, however, the dialed number will have been "ported." In that case, the call is routed via the location routing number, or "LRN" of the dialed number. What is relevant here is that ***local*** number portability — not interexchange carrier selection, as would apply in the case of an interexchange call — is used to specify the terminating carrier.

Once it is determined that the call is bound for a CLEC, the call may go directly to the CLEC switch via a direct end office trunk ("DEOT"), or may go via an ILEC tandem switch. Ordinary Signaling System 7 arrangements are used for these calls. The same trunks carry ISP-bound calls as carry other local calls, even in areas where toll calls are segregated onto separate trunk facilities. The terminating CLEC switch offers the call to the ISP's modem bank using ordinary ISDN PRI or Channelized T1 in-band signaling. Call supervision is returned when the modem answers.

In this regard, note that the LEC-to-LEC call supervision applicable to local calls takes place, regardless of whether or not the ISP, for its own purposes, validates the end user's log-in attempt "in band." As a result, for end users on message unit plans, or making use of the per-call discounted rate for non-local calls within Florida, a message unit or call charge is applied as soon as the modem answers, even if the ISP subsequently refuses to allow the end user's data into the ISP's own equipment (*e.g.*, if the end user enters the wrong password), and even if the ISP's separate telecommunications links to "the Internet" are down (meaning that the end user could not, for example, obtain current web pages from outside the ISP's own (usually limited) cache of web sites). In this respect, too, the call to the ISP is handled just like a call to a local end user. This is to be distinguished from the situation applicable to toll calls, where the end user is not billed unless the IXC is able to establish a connection to the distant location the end user is trying to reach.

Basically, ISP-bound calls are quite similar to voice calls that are delivered in bulk to large users. Telemarketing and customer-support centers, for instance, also frequently have large volumes of traffic terminating on PBX systems or Automatic Call Distributors. From a traffic perspective, an ISP's modem pool looks very much like an incoming PBX trunk group.

Q. **How does this compare to the way in which long distance calls are handled, technically, by the network?**

A. Long distance interconnection is quite different. First, a call handed off by a LEC to an IXC is *not* supervised by the IXC; call supervision is returned only when a terminating LEC at the far end of the call provides it. Second, as a technical matter, the IXC to whom the call is routed is selected by presubscription or CIC dial-around (101xxxx) code, not by destination prefix or LRN. Third, interconnection is far more likely to make use of an access tandem, rather than a local tandem or DEOT. Signaling between the LEC and IXC uses carrier-to-carrier Signaling System 7; calls to ISPs use PRI or Channelized T1 robbed-bit signaling.

Q. **What do these considerations suggest about carriers contracting with each other regarding ISP-bound calls?**

A. Since ISP-bound calls are technically identical to local calls, the logical result from a technical perspective is to include ISP-bound calls with the category of "local" calls in contracts regarding interconnection between carriers and inter-carrier compensation. As noted above, I recognize that parties could choose to draw a distinction among types of calls that are technically identical. My point is simply that there is, indeed, no ***technical*** basis for making such a distinction between ISP-bound calls and other local calls. Consequently, any claim that contracting parties would have had any technical or cost-related reason for distinguishing ISP-bound

calls from other local calls is false.

This also means that a contract that refers generally to "local" calls (such as the one at issue here) would, from a technical perspective, be properly interpreted as including ISP-bound calls within that term. I note in this regard that the Federal Communications Commission ("FCC"), in its order from last February addressing this issue, indicated that the fact that a contract does not separately "call out" ISP-bound calls for separate treatment is a factor that logically weighs in favor of concluding that the parties intended to include ISP-bound calls within the scope of "local" calls. From a technical perspective, I fully concur in the FCC's conclusion in that regard.

Q. **Do you know of any reason why, from a technical perspective, ISP-bound calls should not be viewed as local calls?**

A. No.

Q. **Does this conclude your testimony?**

A. Yes, it does.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 991220-TP

In the Matter of:
Global NAPS SOUTH, INC.

For Arbitration of Interconnection Rates, Terms and Conditions and Related Relief of Proposed Agreement with BellSouth Telecommunications, Inc. under the Telecommunications Act of 1996

EXHIBIT FG-2
FRED GOLDSTEIN
MAY 1, 2000

Before the

STATE OF FLORIDA
PUBLIC SERVICE COMMISSION

Global NAPs, Inc., *Complainant,* *versus* BellSouth Telecommunications, Inc. *Defendant*	Docket No. 991267-TP

Rebuttal Testimony

of

FRED GOLDSTEIN

on behalf of

Global NAPs, Inc.

December 20, 1999

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REBUTTAL TESTIMONY

Qualifications

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

A. My name is Fred Goldstein. I am a consultant with Arthur D. Little, Inc. in Cambridge, Massachusetts. My background and qualifications were set out in my direct testimony in this matter, filed November 24, 1999.

Q. On whose behalf is this testimony being submitted?

A. This testimony is being submitted on behalf of Global NAPs, Inc. ("Global NAPs").

Q. Have you previously submitted testimony in this proceeding?

A. Yes. On November 24, 1999, I submitted pre-filed direct testimony in this matter on behalf of Global NAPs.

BellSouth's Discussion Of How ISPs Handle ISP-Bound Calls Is Wrong.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of this testimony is to respond to some serious technical errors contained in

the direct testimony filed on behalf of BellSouth Telecommunications in this matter. In particular, it is quite clear that Mr. Halprin and Ms. Shiroishi utterly misunderstand the way in which consumers connect to ISPs as a technical matter, and also misunderstand what ISPs do, as a technical matter, once a connection has to a consumer has been established.

Q. How are Mr. Halprin's and Ms. Shiroishi's technical errors relevant to this case?

A. They may not be. As I understand it, this case turns on a fairly simple question, which is whether the term "local" traffic in the Global NAPs/BellSouth agreement (which is actually the DeltaCom/BellSouth agreement) encompasses ISP-bound calls. It is absolutely clear that the normal industry usage from at least 1984 onward included ISP-bound calls within the category of "local" calls, despite the understanding on the part of regulatory theologians that the FCC understood that these calls were in some deep, underlying sense "interstate" in nature. From that perspective what actually happens after an ISP-bound call reaches the ISP doesn't matter — what matters is what I take to be, on some level, a "legal" question: "does this contractual term include this class of calls — however they are handled inside the ISP?"

Mr. Halprin, however, presents testimony that profoundly confuses the FCC's ***jurisdictional analysis*** of ISP-bound calls — essentially, an issue of which legal "box" they fall into under the Communications Act — with a technical description of what actually occurs when an ISP receives calls from end users. And Ms. Shiroishi (particularly at pages 5-10 of her testimony, and in her exhibit) purports to describe "the

nature of ISP traffic" and discusses at some length — though quite erroneously — what ISPs do. As noted above, an accurate understanding of what actually occurs may not matter here. But if it does matter, BellSouth's testimony on this point is totally wrong and cannot be relied upon by the Commission in any way.

Q. What aspects of BellSouth's testimony contain these errors?

A. I am primarily concerned with Mr. Halprin's discussion of whether ISP-bound calls "terminate" at the ISPs' location. See, for example, his discussion at lines 14-19 on page 2, lines 6-10 on page 4, all of page 5, and especially lines 12-23 on page 6. For example, at line 6 on page 4, Mr. Halprin flatly states that the FCC's ***legal, jurisdictional*** conclusion that a communication between a consumer and a distant web site does not "terminate" at the ISP, but instead at the distant web site, "is solidly based in the real world." As for Ms. Shiroishi, as noted, she addresses these matters primarily at pages 5-10 of her testimony, and in her Exhibit.

I believe firmly that the Commission's ability to render an appropriate decision in this case can only be enhanced by a full and accurate understanding of what actually happens during consumers' dial-up sessions with their ISPs. That makes rebuttal of their testimony necessary.

ISP-Bound Calls Involve Complex Activities By Different Types Of Equipment

Q. What actually happens when a consumer establishes a dial-up connection with an ISP?

A. This is actually a complex and multi-stage process.

Start with the consumer's computer and modem, both of which are forms of "customer premises equipment," or CPE. When a consumer wants to log on to an ISP, the consumer tells the modem to dial the ISP's local telephone number, typically by using the computer's mouse to click on an appropriate on-screen icon.

The modem then goes "off hook" and, after receiving dial tone from the consumer's local exchange carrier (typically the ILEC), sends out tones to "dial" the ISP's local number. This dialing leads to the establishment of a normal circuit-switched connection in the public switched telephone network (PSTN) that runs (typically) from the ILEC's switch serving the customer, then over inter-office trunks to the CLEC's switch serving the ISP.

When the CLEC's switch receives the incoming call, it sends the appropriate "ring" signal down the link to the ISP, which is typically over an ISDN Primary Rate Interface (PRI) digital circuit. This message is received by the ISP's modem equipment (like the consumer's modem, a type of CPE, but in the ISP's case usually part of a larger Remote Access Server), which then sends the appropriate "off-hook" message and answers the call.

Q. At this point, has the consumer connected to "the Internet"?

A. At this point, the consumer is not even ***close*** to having a connection to "the Internet." All that has happened thus far is that one modem — a piece of CPE — has called another modem — another piece of CPE.

Q. So, what happens next?

A. The first thing that has to happen is the modems have to get in synch with each other. Most consumer dial-up programs are set up so that the beginning part of this process can be heard over the computer's speakers. After clicking on the icon that causes the log-on sequence to begin, the consumer hears the dial tone from the ILEC's switch, then hears the tones of the modem dialing, then hears the ring on the ISP's local line, and then hears the ISP's modem answer. There then follows a high-pitched tone that rapidly turns into a sound that seems to the human ear to be static.

At this point, most consumer dial-up programs cut off the speakers, so the consumer no longer monitors the actual signaling going on between the ISP's modem and the consumer's modem. In fact, however, this signaling — going ***only*** between these two pieces of CPE — continues without interruption during the entire time the consumer is on-line. Modern modems typically take 20-30 seconds to complete this initial negotiation and line testing phase. This fact has important implications for understanding what portion of a dial-up session might reasonably be viewed as involving a "connection" to the Internet. I discuss these below.

Q. Once the modems are in synch, what happens next?

A. The ISP's Remote Access Server signals other ISP equipment that someone is trying to log on. That equipment automatically tells the modem to, in effect, ask the user to send his login name and password (which dial-up client programs may often send automatically). The ISP's equipment then checks its files to ensure that the name/password combination is a valid account.

Once that confirmation is received, the consumer's computer may send a request for the "start-up page" or "home page" that the consumer has selected, or for some other service such as checking for electronic mail. This request (and all information sent between the consumer and the ISP) is sent by rapidly modulating the tones the two modems are sending to each other in a carefully structured manner. Again, the two modems are constantly sending carefully structured signals to each other, simply to stay "in synch." What conveys the information is ***changes*** in those carefully structured signals.

Q. What would happen if one of the modems stopped sending signals to each other, that is, if there was actually "silence" on the line?

A. If there is truly silence on the line, the modem that detects the silence interprets it as a dead connection and "hangs up." Depending on the consumer's particular software, the consumer is usually advised that the connection has been lost (in the old days of text-only on-line communications, the message "NO CARRIER" would typically appear), and the consumer given an opportunity to re-establish the connection.

Q. So, what happens when the consumer's computer requests the consumer's choice of web page?

A. That depends on what web page the consumer has selected. First of all, the signal requesting the web page goes through the ISP's modem (which recognizes it as something other than the constant synchronization signaling between the consumer's and ISP's CPE) and sends to other ISP equipment. This is the data which flows out of the RAS towards the ISP's other facilities.

In many cases, the consumer has elected to begin his session with a standard start page provided by the ISP. In that case, the ISP's equipment on its own generates a copy of the file representing the start page and sends it to the consumer via the modems and the PSTN connection between them. In other cases, the consumer has selected a page provided by an firm such as Netscape, Yahoo or Excite. Here, the ISP's equipment will often have a copy of those files stored locally, in a "cache," and so sends a copy of the file to the consumer from the local cache.

Q. In either of these cases has the consumer connected to "the Internet" in any way?

A. Only in a rather roundabout sense, but no new information has actually flowed in or out of the ISP's premises yet. All that has happened in these cases is that the consumer has requested certain files (representing "start pages") from the ISP, and the ISP has delivered those files from its own local storage devices. But there is a definitional

aspect to this question as well: where, exactly, does "the Internet" start? Is it at the ISP's computer storage equipment? Is it at the links connecting the local ISP's equipment "upstream" to what is known as the Internet "backbone"? Is it at the "backbone" itself? I discuss these issues later on in a bit more detail, but I wanted to flag them now because of a particular aspect of Mr. Halprin's testimony.

Q. What part of Mr. Halprin's testimony are you referring to?

A. On page 5, at lines 12-20, Mr. Halprin makes the following statement:

> "Once the call is connected to the Internet, no more circuit switching is involved. ***The caller effectively becomes part of the Internet, a destination point that any other person connected to the Internet can also reach, from any point on the globe.*** In short, a call to the Internet that is placed through an ISP established a real-time communication between the end user and the destination point or points he or she is seeking to reach on — or even beyond — the Internet. The communication can take the form of voice, data, fax, audio, or video transmissions."

(Emphasis added.) Now, there are some serious technical flaws in this statement — particularly the last sentence — but what matters here is to note that Mr. Halprin, like a good stage magician, is basically putting a rabbit into his hat here, so he can pull it out later on for dramatic effect. Under Mr. Halprin's theory, all contacts between an end user and an ISP are inherently and always somehow "interstate" (and, therefore, not

"local") for no other reason than that they are connections to ISPs. (I would also note, for what it is worth, that Mr. Halprin's key theory here — that the "Internet" extends to include not only the ISP, but also the end user — is contradicted by Ms. Shiroishi's approach, as shown in her exhibit, which indicates that "the Internet" begins ***beyond*** the ISP. Also for what it is worth, I would disagree with both of them: in my view, an individual ISP's servers and routers are part of the Internet, but the ISP's modems — and certainly the end user's equipment — are not.)

Unlike Mr. Halprin, I'm not a lawyer, so I suppose it is ***possible*** that the FCC or the courts could adopt such an analysis. But is seems fairly clear to me that the FCC, in its February 1999 order on this topic, did not, in fact, adopt such an analysis. Reading the FCC's order from my technical perspective, what the FCC did was focus on where the signals sent from the consumer's computer actually go, and where the signals sent to the consumer's computer actually come from. Because (as discussed in detail below) a good portion of the ***files*** that consumers obtain during on-line sessions come from distant locations, the FCC concluded that "at least a substantial portion of" the communications involved in obtaining those files are interstate. (This quote is from paragraph 20 of the FCC's February 1999 *Declaratory Ruling* on ISP-bound calling.) I have no quarrel with that conclusion as far as it goes. But the FCC specifically left open the question of whether it should make an effort to distinguish between the interstate and intrastate portions of the consumer communications with ISPs (*i.e.,* that is one of the open issues in the ongoing federal rulemaking) (*see* footnote 73 of the *Declaratory Ruling,* and paragraph 36 of the order itself).

Now, I obviously don't know what the FCC will decide on that question. But from my technical perspective, I am glad that the FCC recognized that it was a question to be asked. What this means, though, is that Mr. Halprin's analysis cannot be correct. If the FCC agreed with Mr. Halprin that all consumer connections to ISPs were inherently and continuously "interstate" (on the theory that a consumer's computer dialed-in to an ISP becomes itself a part of the Internet) the FCC would not have needed to ask the question about segregating interstate and intrastate communications at all.

What this means in the context of this case is that Mr. Halprin is proceeding from a philosophical approach to what it means to be "part of" the Internet that — whatever it may have to recommend it in the abstract — is not the approach that the FCC has used in its analysis of this issue. Aside from casting doubt on Mr. Halprin's conclusions, this emphasizes the importance of precisely the information that he does not present — what actually happens, in terms of what entities and pieces of equipment communicate with each other — during an on-line session.

How Consumers Get Information From ISPs

Q. Before discussing this problem with Mr. Halprin's testimony, you had just described how consumers can get their start pages sent to them from local ISP equipment, either because it is the ISP's own start page, or because the ISP has a cached copy of the start page the consumer has requested. What happens if the consumer's requested information is not locally stored by the ISP?

A. Here we need to describe briefly how particular files are requested from the World Wide Web. Although consumers think of web pages as having "names," such as www.wsj.com for the on-line edition of the Wall Street Journal, or www.cnn.com for the on-line edition of CNN news, in fact packets are routed around the Internet on the basis of ***numbers.*** These numbers are generally represented in the "dotted decimal" form of four numbers, "xxx.yyy.zzz.qqq," where "xxx," "yyy," "zzz," and "qqq" are all between 0 and 255. They are the actual Internet "address" for a particular computer.

So the first thing that happens when the consumer's computer tells the ISP's computer that the consumer wants the CNN page is that the ISP "resolves" www.cnn.com into the number that "really" defines the CNN page's location on the Internet, and returns this number to the consumer's computer.

Some ISPs perform this function themselves, maintaining a database that they periodically update from so-called Internet "root" servers to ensure that the translation between name and number is up to date. Other ISPs outsource this function, sending to another ISP's name server requests to resolve a particular domain name requested by a consumer into the correct assigned number. Note that while an ISP that outsources the translation function may indeed send queries to a distant database to obtain the correct Internet address, this "behind the scenes" function is performed by the ***ISP,*** not by the consumer.

A reasonable analogy in the PSTN is the situation of a customer calling an "800" number. When a customer dials an 800 number, the LEC's switch sends out a query to

a database (that may be located in another state) to get call routing instructions for the number. The call is then routed to the appropriate carrier, who may translate it into a "real" number. Now, that call will be either interstate or intrastate depending on the locations of the calling and called parties, but the fact that the ILEC's database lookup may have involved a ***query*** that crossed state lines has no effect on the jurisdictional status of the call itself.

Q. What happens next?

A. Once the ISP has the Internet address of the web page that the consumer wants, the ISP sends that request "upstream" to the Internet backbone. It is routed over the backbone to the location (wherever it might be) that contains the requested files. Those files are then transmitted back up to the backbone, across the backbone to the consumer's ISP, then down the backbone to the consumer's computer, where the browser software displays them as text, graphics, or whatever they are intended to represent.

Q. Were all those packets going between the consumer and the selected web site "interstate" packets?

A. That depends, under the FCC's analysis (but not Mr. Halprin's) on whether the consumer and the selected web site are in the same state or not. If so, then the communication that just occurred between the consumer's computer and the web site are intrastate; if not, they are interstate.

Q. What happens next in an online session?

A. Typically what happens next is extremely significant in assessing, from a technical perspective, the "local" versus "interstate" nature of what occurs during an on-line session.

What usually happens is that the consumer takes a few minutes to look at the information on the chosen web page before deciding what to do next.

Q. Why is that significant?

A. It is significant because during the time that the consumer is looking at the information that has been received, the ***only*** communication that is going on is between the consumer's modem and the ISP's modem, which — as noted above — are ***constantly*** sending signals to each other during the entire on-line session. Again, as noted above, information, such as the content of files representing web pages, is represented by carefully structured ***changes*** to the already-carefully-structured synchronization signaling that the two modems are sending each other. During the entire time that a consumer is reviewing information that has been received either directly from, or via, the ISP, continuous, active communications are occurring between the two modems, ***and those communications absolutely, unambiguously, and without question never go beyond those modems.***

It seems clear to me that if — as seems plainly to be the case based on the FCC's

February 1999 order — the status of communications during an on-line session as interstate or intrastate depends on the particular end-points of the various signals that are sent to and from the consumer during the session, then any analysis that ignores the signals that the modems actually send to each other, and what actually happens with those signals, is deficient not only from a technical perspective, but also out of synch (so to speak) with the FCC's approach to this question.

Q. Thus far you have discussed what happens when the consumer requests his or her start page. What other activities do consumers typically engage in during on-line sessions with their ISPs?

A. Although "the Internet" is many things and offers access to many capabilities and applications, it is clear that the two most used and significant applications today are web browsing and email.

How Web Browsing Works

Q. How does web browsing work, from a technical perspective?

A. Actually, web browsing is pretty much like the process described above, just carried on repeatedly. The end user indicates (either by clicking on a link on a web page or a bookmark, or by typing in a web address or URL) that the user wants a particular page delivered. The ISP (directly or indirectly) resolves the URL into an actual numeric web address (if need be), and the user requests the desired page, by numeric

IP address, from the ISP. The ISP then checks to see if it has the requested files locally cached. If it does, it delivers them from the local cache. If not, it sends out a request that they be delivered to the end user. That request transits "the Internet" to the location where the files are to be found; the server hosting the files sends them back to the requesting ISP, which then sends them to the end user.

At that point, the end user reviews what has been downloaded. While that review is taking place, the only transmissions between the end user and the ISP are the constant modem synchronization signals discussed above. No information comes to or from "the Internet" during that time.

Q. Does caching take place at locations other than the local ISP?

A. Absolutely. Indeed, one important place where caching occurs is on the end user's own computer, in memory or on a hard drive. Most browser programs make a point of storing on the end user's hard drives copies of all of the web pages that an end user has "visited" recently. If, during the course of a session, the end user requests the same web pages again (either by clicking the "back" button on the browser or by reentering the same URL or address), the browser typically displays those files from the local hard drive. During the time that these functions are executed on the end user's own computer, again, the only signals on the line between the end user and the ISP are the modem synchronization signals.

Q. Where else does caching occur?

A. Actually, caching is increasingly common at many locations throughout the Internet. On the one hand, important Internet "backbone" providers such as UUNet and Digex are also providers of web hosting services to firms that have web pages that they want to make available over the Internet. These combined backbone/web hosting firms have a strong incentive to distribute copies of frequently accessed web pages around their network so that customers in Miami seeking a copy of a popular web page do impose network and bandwidth costs on the backbones by repeatedly having the same page delivered from (say) San Francisco. A cached copy in or near a backbone provider's facilities in Miami avoids the need for those multiple, repetitive transmissions.

In addition, firms with web pages are increasingly concerned that consumers not be subjected to the "world wide wait" while the page downloads from some distant location to wherever the consumer happens to be. For this reason, innovative entrepreneurial firms are offering dynamic caching services which establish copies of popular web pages at a number of different — and changing — locations over the course of a day, so that the time to get the file from the server on which it resides to the consumers seeking access to it is minimized. This process, too, logically leads to an increasing portion of web pages being delivered from intrastate and/or local servers, even if the web page's "home" server is far away.

Q. Please summarize what happens when a consumer browses the web by means of a dial-up connection to an ISP.

A. The consumer requests a particular web page. If it is already cached on the consumer's hard drive, it is "delivered" from there. If not, the browser software requests it from the ISP. If the ISP already has a local copy of the web page cached, it is delivered from there. If not, the ISP requests it from "the Internet," which duly delivers it back to the ISP and on to the consumer. The consumer then reviews the information that has just been delivered. During the time that the information is being reviewed — which is often ***much*** longer than the time it takes to download the information — the only communication is between the end user's modem and the ISP's modem. No signaling even reaches the ISP's servers and routers, much less "the Internet" during this time period.

How Email Works.

Q. The other main application you referenced is email. How does email work as it relates to this case?

A. There are two kinds of email most relevant here. One is so-called web-based email. In a web-based email system, the email service is provided using the web itself. A good example of this is Hotmail. An end user with a Hotmail account first goes to www.hotmail.com, which is a web page. The end user then fills out the form giving login ID and password. This information is used by the Hotmail system to send the end user ***another*** web page, this one indicating the messages that the end user may have to read. The end user then selects a message to read by clicking on it. That

click actually sends information back to Hotmail, which then sends the requested message back to the end user, again in the form of a web page.

Now, a local ISP will not likely have a cached copy of any particular end user's email from Hotmail, so the actual downloads of the web pages containing email messages typically do involve actual transmissions to and from the Internet. But just like with normal web pages, while the end user is reviewing what is received — which, in this case, includes the time the end user spends composing a response — all that is going on is the purely local modem synchronization signaling.

The other way email typically works is that it is a service provided by the end user's ISP. In that case, the ISP maintains an email server which receives messages from anywhere on the Internet addressed to its email customers. Those messages are stored on the ISP's email server. When the end user logs on, his mail client program queries the email server to see if there is new mail waiting. If there is, then email messages are downloaded from the ISP's email server to the end user. These email servers are often located in the same building (and often use exactly the same equipment) as the ISP's other equipment, so the downloads of stored emails are "local," just like the downloads of cached web pages are. And, whether a customer's email is web-based or provided by the local ISP, only local modem synchronization signaling occurs while the customer is reading the mail that has been received and composing responses to it.

Less Than 10% Of On-Line Minutes Are "Interstate" Under The FCC's Approach.

Q. Based on all of these factors — the predominance of modem synchronization signaling, the use of local caching by ISPs, etc. — approximately what proportion of the time that a typical consumer is "on line" actually entails sending packets to, or receiving packets from, any location beyond the ISP?

A. Substantially less than 10% of the traffic in an average on-line session actually involves any transmissions beyond the ISP's ***modem***, much less beyond the ISP's premises and onto the "Internet" as a whole.

Q. On what do you base that conclusion?

A. Part of it is simply common sense, once the actual mechanics of modems, web browsing and email are understood. But I also have extensive experience consulting with and advising ISPs regarding how to configure their data networks, both in connection with how many local exchange lines to obtain in what local areas, and in connection with how ISPs configure their networks on "their" side of the modem. Based on that experience, I am aware that a typical ISP provides average capacity from the "back end" of its modem banks (RAS) "upward" to the ISP's own routers and servers of approximately 5000 to 6000 bits per second. At the same time, however, note that a digital ISDN PRI trunk (the most common type of line connecting an ISP to the PSTN) carries a continuous signal of 64,000 bits per second per call. (This 64,000 bits-per-second signal carries the modem synchronization

signaling discussed above. That signaling is ***changed*** when higher-level data are being exchanged, but it ***continues*** across the *local* PSTN at 64,000 bps whether or not any such higher-level data are being exchanged.)

This means that somewhere between 8% to perhaps 9.5% of the signaling carried on a typical dial-up connection, during a web-browsing session, actually represents data that needs to go beyond the ISP's modem at all. Of that, estimates of caching efficiency vary, but it is safe to say that somewhere between 10% and 40% of web pages requested by consumers would typically be delivered from the user's or an ISP's cache, as opposed to from a distant web site. E-mail uploading and downloading also makes use of local servers, not the backbone. Many users also make use of net news reader programs, which communicate with the ISP's own news server. Taking these factors into account as well, somewhere between about 4% and about 8% of the actual communications carried between an ISP and a consumer during a dial-up session are "interstate" as the FCC has defined that term (*i.e.*, involve connections between an end user in one state and a web site in a distant state). The remainder of the time, on average — that is, between 92% and 96% of the minutes of the ISP-bound traffic at issue in this case — the only communications that occur are completely local.

Q. How does the FCC handle situations in which such a small proportion of traffic is "interstate" on a shared facility?

A. The answer actually depends on whether the facility is treated as switched or

dedicated. Switched facilities are generally allocated to interstate and intrastate jurisdictions based on studies or estimates of interstate versus intrastate usage. Dedicated facilities are presumed to be interstate if the traffic is 10% or more interstate, and presumed to be intrastate if the traffic is less than 10% interstate. So, here, either the traffic could all be treated as intrastate, or the parties could designate a "percent interstate" factor and apply that to total minutes to determine what is local and what is not. As indicated above, a "non-local" factor of 4% to 8% of total minutes for ISP-bound calls would be appropriate in light of how these communications are actually handled by ISPs.

Q. Is there precedent in the telecommunications industry for using such factors when direct measurements are not possible?

A. Yes indeed. After the divestiture of the Bell companies from AT&T, but before the now near-universal availability of "equal access" arrangements, it was technically impossible in some situations to give long distance carriers the same "1+" dialing that was available to AT&T. In those situations, long distance carriers at times used what was known as "Feature Group A" lines. A Feature Group A line was basically just a local telephone line connected to the long distance carrier's switch. A customer seeking to make a long distance call dialed the local number for the switch, entered account identifying information, then dialed the actual long distance call the customer was trying to make.

One of the many technical problems with Feature Group A lines was that it was

impossible for the Bell company to measure whether the calls the end users were making were interstate or intrastate in nature, since the Bell company did not get any information on the actual number the end user was dialing. This mattered because interstate and intrastate Feature Group A rates were different.

To solve this problem, carriers adopted "PIU," or "Percent Intrastate Use" factors to apply to Feature Group A lines. The interstate and intrastate charges for those lines were then pro-rated based on the PIU factor.

The situation here is broadly analogous, and it would not be at all inappropriate to establish a "percent local use" factor in the 92% to 96% range for ISP-bound calling.

Q. If so much of the time that end users are on line actually does not involve any interstate transmissions, why did the FCC say that ISP-bound calls are "largely" interstate?

A. As noted above, when they were directly focused on the issue, all that they said was that "at least a substantial portion of" the ***communications*** between end users and web sites were interstate — and I agree with that. Beyond that, though, I think two factors were at work. First, although the FCC noted that caching technologies exist, it did not make any effort to assess how extensively they were used, or what percentage of time was spent using locally-served applications. Second, the FCC did not focus at all on the actual technological issues involved in the use of modems in dial-up access, including, specifically, the duration and importance of modem signaling.

Clearly, however, the FCC understands that this is an issue, since it sought comment in the rulemaking on the question of segregating ISP-bound traffic into interstate and intrastate components.

Q. How does the fact that the vast majority of communications between end users and ISPs are literally "local" affect the outcome of this case?

A. That, of course, is a question for the Commission to decide. As I understand the FCC's rulings on this topic, it may not matter at all whether 95% of the communications are local or if (contrary to fact) 95% of those communications were interstate. This is because the FCC (as I understand it) has said, first, that carriers may have agreed (explicitly or implicitly) to treat even interstate ISP-bound communications as "local" under an agreement; and, second, that states may require compensation for ISP-bound traffic as an interim measure while the FCC sets final rules, irrespective of its actual or potential character as interstate. So from this perspective, it doesn't matter at all what "really" happens; what matters is what the parties' agreed to (a legal question for the Commission) and/or what policy the Commission wants to implement.

On the other hand, it seems to me that a lot of BellSouth's claims in this case about what it agreed to (or, more properly, its claims about what it didn't agree to), contained in the testimonies of Mr. Halprin and Ms. Shiroishi, are based directly or indirectly on certain ***factual*** assertions about what ***actually happens*** with the various

communications involved in ISP-bound calling. For the reasons discussed above, those assertions are quite wrong. As just noted, all of those assertions may be legally irrelevant; but if the Commission finds that they ***are*** relevant, then the purpose of my testimony is to explain why they are wrong, and cannot reasonably form the basis for a Commission decision in this case.

Q. Does that conclude your rebuttal testimony?

A. Yes, it does.