ORIGINAL

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.