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Re: Docket No. 000075-TP

Dear Ms. Bayo:

Enclosed herewith for filing in the above-referenced docket on behalf of A&T Communications of the Southern States, Inc., TCG of South Florida, Global NAPS, Inc., MediaOne Florida Telecommunications, Inc., Time Warner Telecom of Florida, LP, Florida Cable Telecommunications Association, Inc., and the Florida Competitive Carriers Association are the following documents:

1. Original and fifteen copies of the Prefiled Rebuttal Testimony and Exhibits of Lee L. Selwyn.

Please acknowledge receipt of these documents by stamping the extra copy of this letter "filed" and returning the copy to me.

Thank you for your assistance with this filing.

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Sincerely,

Kenneth A. Hoffman

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By: ______________________
KENNETH A. HOFFMAN, ESQ.

Before the

STATE OF FLORIDA
PUBLIC SERVICE COMMISSION

Re: Investigation into appropriate methods to compensate carriers for exchange of traffic subject to Section 251 of the Telecommunications Act of 1996	**Docket No. 000075-TP – Phase II**

Rebuttal Testimony

of

LEE L. SELWYN

on behalf of

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

April 19, 2001

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REBUTTAL TESTIMONY

Introduction

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

A. My name is Lee L. Selwyn; my business address is One Washington Mall, Boston, Massachusetts 02108. I am President of Economics and Technology, Inc.

Q. Are you the same Lee L. Selwyn who submitted Direct Testimony and Rebuttal Testimony in Phase 1 of this proceeding on December 1, 2000 and January 10, 2001, respectively, and Direct Testimony in Phase 2 of this proceeding on March 12, 2001?

A. Yes, I am.

Q. What is the purpose of the additional testimony that you are offering at this time?

A. This testimony responds generally to the direct testimony submitted by BellSouth witness John A. Ruscilli and Verizon-Florida witnesses Terry Haynes, Howard Lee Jones, Elizabeth A. Geddes, and Edward C. Beauvais, with respect to Issues Number 11 through 15 that the Commission has designated for consideration in this phase of this proceeding.

I would note at the outset, however, that the positions of BellSouth and Verizon-Florida, as expressed in the above-referenced direct testimony, were anticipated and thus were thoroughly addressed in the prefiled direct testimony submitted in this Phase by myself and by Gregory R. Follensbee on behalf of AT&T, TCG and MediaOne. Accordingly, I will not reiterate or repeat the discussion of these issues that I have already submitted, but will attempt in this brief rebuttal testimony to explore the fundamental policy conflict between the ILEC and ALEC positions.

Faced with the prospect of growing competition and technological innovation of a type and scale without precedent in the telecommunications industry, the ILECs are asking this Commission to force ALECs to operate under the antiquated and technologically obsolete business model that the ILECs had created during a century of protected monopoly status.

Q. Dr. Selwyn, in reviewing the BellSouth and Verizon direct testimony in this Phase of the proceeding, have you been able to identify a common theme that underlies the various positions being advanced by these two ILECs on each of the issues that have been identified by the Commission for consideration in this Phase of the proceeding?

A. Yes. Reduced to its essence, BellSouth and Verizon are asking that the Commission adopt measures whose effect will be to insulate and protect them from innovations both with respect to technology and service development by their ALEC rivals, by either penalizing the ALECs for deviating from the traditional ILEC business model or by constraining the ALECs' ability to develop and introduce new services, pricing plans, and other market-responsive initiatives.

As long as an ALEC enables the ILEC to access all of the ALEC's customers within a LATA via a single point of interconnection with the ALEC, the ALEC should be entitled to the tandem reciprocal compensation rate and should not be penalized by its failure to adopt an ILEC type of multi-level network architecture.

Q. Please review each of the major Phase 2 issues and, as you discuss each of them, identify specifically where and how the ILECs' position amounts to the type of market protection that you have just described. First, please address the matter of network architecture and its relationship to the issue of "tandem" vs. "end office" reciprocal compensation. Can you summarize and discuss your understanding of the ILEC and ALEC positions on this issue?

A. Yes. Issues 11 and 12 state as follows:

Issue 11. *What types of local network architectures are currently employed by ILECs and ALECs, and what factors affect their choice of architecture? (Informational issue)*

Issue 12: Pursuant to the Act and FCC's rules and orders:

(a) Under what condition(s), if any, is an ALEC entitled to be compensated at the ILEC's tandem interconnection rate?

(b) Under either a one-prong test or two-prong test:

(i) What is "similar functionality?"

(ii) What is "comparable geographic area?"

Much of both the ILEC and ALEC testimony underscored the key difference between the design of traditional ILEC networks and that which is commonly adopted by ALECs. ILEC networks consist of a relatively large number of individual switching entities. Most of these serve end users ("end office switches") and are deployed in close geographic proximity to the customers they serve, making the length of subscriber lines ("loops") connecting the central office with the customers' premises relatively short. ILEC end office switches are interconnected with one another either directly or via a "tandem switch," the former approach being used when the volume of traffic between two specific switches is sufficiently high that direct interoffice trunking is more economical than the use of an intermediate switching operation. Exhibit ____ (GRF-1) to Mr. Follensbee's direct testimony provides an illustration of the ILEC network configuration.

ALEC networks, on the other hand, generally consist of a relatively small number of switches (e.g., one in each LATA) that serve a large geographic area (e.g., the entire LATA or a significant portion thereof). Exhibit ____ (GRF-2) to Mr. Follensbee's direct testimony illustrates this type of architecture.

It has long been understood in the telecommunications industry that there are clear economic tradeoffs between the relative quantities of transmission vs. switching facilities in a network. ILEC networks employ many switches so as to minimize the need for transmission facilities; ALEC networks employ extensive transmission or other substitute facilities so as to minimize the need for switching. There are several reasons why ILECs and ALECs have reached these fundamentally different conclusions with respect to this tradeoff, but they largely boil down to two factors – *scale* and *relative cost.* At the time that ILEC networks were built, transmission facilities – particularly over large distances – were fairly expensive, and those costs could be minimized by deploying switches in close proximity to customers and by routing most interoffice traffic via tandem switches. Additionally, the capacities of the electromechanical switches that were used by ILECs until the early 1980s were fairly limited, so there wasn't much benefit in terms of switch costs in placing, say, ten switches in one building to serve a large area (with long subscriber lines) vs. placing those same ten switches in ten different buildings each much closer to the customers they would serve, thereby saving on transmission costs.

The technology and the associated cost relationships had changed dramatically by the time ALEC networks were being designed and built, beginning in the mid- to late-1990s. Switch capacities had grown and, because an ALEC typically serves only a small fraction of the number of customers that are served by an ILEC, in most cases an ALEC's switching needs for an entire LATA (sometimes even several LATAs) could be satisfied by one switch. At the same time, transmission costs have decreased by orders of magnitude and by now have fallen to the point where they are today just a tiny fraction of what they were when the ILECs began to build out their infrastructure. Put in its simplest terms, the key difference between an ILEC and an ALEC network is that the ILEC network provides transport *on the trunk side* of its switches, whereas the ALEC network provides any necessary transport *on the line side* of its (usually one) switch.

Q. Don't ILECs today confront the same technological and cost conditions as do the ALECs?

A. Yes, and to a limited extent ILECs have begun to consolidate smaller switches into so-called "host/remote" configurations that take advantage of the larger capacities and lower costs characteristic of modern digital switching systems. However, the basic network design philosophy that the ILECs have been following for more than a century remains firmly entrenched in their business practices, and continues to dictate not only the ways in which ILECs deploy switching and transmission systems, but also the way they package, price and offer their various local and interexchange services.

The economic and business choices facing the ILECs are quite different from those confronting ALECs. Whereas ALECs ask, "what is the most efficient design of a *new* network," ILECs ask, "what modifications can efficiently be made to an *existing* network?" Even if we assume that ILECs and ALECs face the same resource costs and relative prices, their networks will still look very different for many years (or even decades) into the future as a consequence of their different starting points.

Q. Why does the nature of the ALEC's choice of network architecture matter to the ILEC with respect to the issue of the interchange of traffic between the two carriers?

A. It doesn't, or at least it shouldn't. By delivering traffic to an ILEC tandem, the ALEC is able to reach all of the areas subtending that tandem via a single physical interconnection. Indeed, due to tandem-to-tandem connections, an ALEC link to a single ILEC tandem should suffice for connectivity to the entire LATA. Similarly, by delivering traffic to the ALEC's switch, the ILEC is also afforded the ability to reach all of the ALEC's customers via a single physical connection. The fact that an ILEC tandem is capable of making "trunk-to-trunk" connections whereas an ALEC switch may sometimes only be capable of making "trunk-to-line" connections is immaterial, irrelevant and, most importantly, *entirely transparent to the ILEC.*

Q. So what is the source of the ILECs' argument that where no literal "tandem functionality" is being provided by the ALEC, the ALEC is then entitled to reciprocal compensation only at the "end office" rate?

A. What the ILECs' position amounts to is an attempt to penalize ALECs for adopting a technology and network arrangement that is not precisely identical to that being used by the ILEC, in effect, to *protect* the ILEC from having to compete with entrants who have been able to achieve efficiencies that may not have been available to the ILEC when, under its protected monopoly status, it designed and built out its network and that, for whatever reason, the ILEC chooses not to pursue now and in the future. Penalizing ALECs for adopting alternative but functionally equivalent solutions amounts to nothing less than asking them to compete with their hands tied behind their backs. Such a policy is fundamentally antithetical to the development of economically efficient competition, and the Commission should resist and reject outright the ILECs' attempts to use the Commission's regulatory machinery to insulate themselves from the efficiencies and innovations that a competitive marketplace is *expected* to foster.

ALECs should not be forced to conform to monopoly-era ILEC local/toll pricing distinctions and local calling area definitions, and should be permitted to offer their customers the same type of "virtual presence" in a distant ILEC local calling area as ILECs themselves offer their customers via Foreign Exchange and Remote Call Forwarding services.

Q. I would like to turn next to the issues of the "local calling area" and the related issues of so-called "virtual NXX codes" and the responsibility for the costs of transport. Please summarize your understanding of the ILEC and ALEC positions on these issues.

A. Issues 13, 14 and 15 state as follows:

Issue 13. *How should a "local calling area" be defined, for purposes of determining the applicability of reciprocal compensation?*

Issue 14. *(a) What are the responsibilities of an originating local carrier to transport its traffic to another local carrier?*

(b) For each responsibility identified in part (a), what form of compensation, if any, should apply?

Issue 15. *(a) Under what conditions, if any, should carriers be permitted to assign telephone numbers to end users who are physically located outside the rate center in which the telephone numbers is homed?*

(b) Should the intercarrier compensation mechanism for calls to these telephone numbers be based upon the physical location of the customer, the rate center to which the telephone number is homed, or some other criterion?

The ILECs seem to be taking the position that *their* definitions of local calling areas should generally apply to all local carriers, although Mr. Ruscilli (for BellSouth) is somewhat confusing on this point. At page 12 of his testimony, he states that "[f]or purposes of determining the applicability of reciprocal compensation, a 'local calling area' can be defined as mutually agreed to by the parties and pursuant to the terms and conditions contained in the parties' negotiated interconnection agreement" and that "[t]he Commission should allow each party to establish their [sic] own local calling area for reciprocal compensation purposes." However, at page 27, Mr. Ruscilli explains that "BellSouth's position is that regardless of the numbers an ALEC assigns to its end users, BellSouth should only pay reciprocal compensation on calls that originate and terminate within the same local calling area." Read in the broader context of his testimony, the "same local calling area" to which he refers is the one as defined and established by BellSouth. Mr. Haynes for Verizon appears to adopt substantially the same view as BellSouth.

Specifically, both BellSouth and Verizon argue that, while the ALEC should be free to define its own local calling area with respect to *outgoing* calls placed by its customers, it should not be permitted to trump the ILECs' definitions by, for example, defining a "virtual NXX" code within an ILEC local calling area that is distant from the location at which calls to that number will be terminated.

Q. At first glance, that position doesn't seem all that unreasonable. In what respects do you find it objectionable?

A. The ILECs would have the Commission believe that the idea that the rate center in which the dialed number is homed might differ from the rate center in which the call is actually terminated is something that the ALECs invented, yet that is certainly not true. In fact, ILECs have been offering foreign exchange ("FX") service for decades, and FX service accomplishes essentially the same result, although it is provisioned in a different way.

Q. Please explain.

A. In the case of FX service, a customer located in exchange A might want a local telephone number presence in exchange B, from which exchange A would otherwise be a toll call. A caller in exchange B dials the FX number as a local call to exchange B, yet the call is physically delivered to the FX customer located in exchange A. That's pretty much what happens under the "virtual NXX" approach that is used by some ALECs.

Q. How is the FX service physically provisioned?

A. Usually, but not always, the FX service involves a leased line connecting the central offices in the two exchanges. The FX customer pays for the dial tone line in exchange B and pays for the leased line between exchange B and exchange A. Sometimes, the ILEC may elect to provision the FX service via a switched rather than a dedicated interexchange connection. Such an arrangement, if used, is (supposed to be) transparent to the customer, who will still be charged a flat monthly rate for the leased line.

Another means for accomplishing the customer's objective (of having a local number presence in exchange B) is through the use of "Remote Call Forwarding" ("RCF") service. Instead of using and paying for a leased channel between exchange A and exchange B, calls placed to the exchange B phone number are forwarded by the central office switch in exchange B to the customer's phone number in exchange A. The calling party (in exchange B) still sees the call as a local call, while the exchange A RCF customer pays the toll charge for the call from B to A. In both of these cases, the exchange A customer's *inward* local calling area has been expanded to include exchange B.

Q. But, as Mr. Ruscilli has specifically noted, where FX service is provided, "[t]he reason the originating end user is not billed for a toll call [to the FX number] is that the receiving end user has already paid for the charges from the real NPA/NXX office to the FX office. There are charges for this function and they are being paid by the customer that is benefiting [sic] from the FX service."[1] Why isn't that a fully sufficient explanation as to why BellSouth's FX service is acceptable while an ALEC's use of a "virtual NXX" code to accomplish a similar functionality for its customer is not?

A. Mr. Ruscilli is describing how BellSouth has elected to *price* its foreign exchange service offering; i.e., on a distance-sensitive basis as a toll-replacing service alternative. BellSouth obviously has the right to price this service in any way that it wishes (and that the Commission approves), but what BellSouth does not have the right to do is to force ALECs to adopt its pricing model and strategy.

Q. Can't ALECs provide the same types of FX and RCF services as do ILECs?

A. No. Recall from our earlier discussion that while a typical ILEC network consists of numerous local end office switches each one of which is in close physical proximity to the customers it serves, a typical ALEC network consists of only one switch. Both FX and RCF provisioning arrangements require the physical presence of a switch within the "foreign" rate center, something that simply does not exist under the ALEC network architecture. Put another way, the ILEC is able to create a virtual presence for its exchange A customer in exchange B because it owns switches in both exchanges. As both Mr. Follensbee and I have discussed in our respective direct testimony,

1. Ruscilli (BellSouth), at 31.

the *Telecommunications Act* ("TA-96") requires that ALECs not be handicapped with respect to the nature of the services they can offer merely as a result of their lack of ubiquity. ALECs must be afforded the opportunity to compete with ILECs in the market for FX-type services, and ILECs should not be allowed to escape such competition solely because their infrastructures are more extensive than those of the new entrants.

Q. Well, if the ALEC does not own switching and transmission facilities in each ILEC local calling area, doesn't that simply mean that ALECs can't be in the FX/RCF business?

A. No, not at all. What it means is that the ALEC will need to develop an alternative means for accomplishing the equivalent functionality from the perspective of its customers. And that alternative to the ILECs' creation of a virtual presence for their FX customers in the "foreign exchange" is for the ALECs to use NXX codes rated in exchanges other than the one at which the incoming call will ultimately be delivered – which is exactly the same as what happens in the case of an ILEC FX or RCF call.

Q. So why has this become an issue?

A. It basically boils down to one of pricing. As I discussed both in my direct testimony and here as well, the costs of transport have been dropping at an enormous rate in recent years. This point is highlighted in an article appearing in the January 2001 issue of *Scientific American,* "The Triumph of the Light" by Gary Stix. I have reproduced a copy of this article as Exhibit ____ (LLS-1) to my rebuttal testimony.

The article reports that "the number of bits a second (a measure of fiber performance) doubles every nine months for every dollar spent on the technology." In other words, the cost per unit of transport is cut by 50% *every nine months*. Put another way, over the past five years, the cost per unit of telecommunications transport has fallen by more than 98%!

Q. What has happened to the prices that BellSouth and Verizon charge for toll and FX services over that same period?

A. Not very much. BellSouth's Basic residential intraLATA toll rates in Florida have decreased by about 25% over the period, but basic business toll rates have actually increased by about 20%.[2] Verizon's toll rates decreased by about 10% over the same period.[3] FX rates for both BellSouth and Verizon

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2. *Compare* Southern Bell Telephone and Telegraph Company–Florida General Subscriber Service Tariff, A18. Long Distance Message Telecommunications Service, A18.3.1, Service Between Land Wire Telephones, Third Revised Page 4.1, Issued June 1, 1995, Effective September 9, 1995, *with* Third Revised Page 5, Issued July 5, 2000, Effective July 20, 2000 (current tariff).

3. *Compare* GTE Florida Incorporated-Florida General Services Tariff, A18.
(continued...)

did not change at all over the past five years.[4] Obviously, if this market were competitive, we would have seen far greater price decreases than actually took place.

Q. Should the Commission permit ALECs to compete for ILEC FX and RCF customers by using "virtual NXX" codes?

A. Yes, because to prohibit their use would be to penalize the ALECs for their lack of ubiquity while at the same time permitting ILECs to continue to offer their customers a "virtual presence" in an existing ILEC NXX code, thus protecting the ILECs from ALEC incursions into the FX/RCF market segment.

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3. (...continued)
Long Distance Message Telecommunications Service, A18.5.1, Service Between Land Wire Telephones, Third Revised Page 8, Issued October 5, 1995, Effective December 4, 1995, *with* Fourth Revised Page 8, Issued May 13, 1997, Effective June 2, 1997 (current tariff).

4. *Compare* Southern Bell Telephone and Telegraph Company–Florida General Subscriber Service Tariff, A9. Foreign Exchange Service and Foreign Central Office Service, A9.1.6, Rates and Charges, Second Revised Page 1.5, Issued June 5, 1991, Effective February 10, 1992, *with* Original Page 7, Issued July 1, 1996, Effective July 15, 1996 (currently effective tariff); *Compare* GTE Florida Incorporated-Florida General Services Tariff, A9. Foreign Exchange Service and Foreign Central Office Service, A9.1.10, Rates and Charges, Second Revised Page 2.4, Issued January 5, 1994, Effective February 10, 1994, *with* Third Revised Page 2.4, Issued September 26, 1997, Effective October 15, 1997 (currently effective tariff).

Q. But isn't one of the reasons why ALECs are able to provide these pseudo FX services to their customers at the same price they charge for "local" service is because, at least according to the ILECs, the ALECs are not currently paying the ILECs for the interexchange transport that the ILECs provide between the point of origin of the call to the point of interconnection with the ALEC?

A. I do not necessarily agree with the ILECs' contention that ALECs are not paying for this supposed interexchange transport. While it is true that there is, for the most part, no distance-sensitive element in ALEC/ILEC interconnection agreements, it is also the case that distance sensitive costs of interoffice and interexchange transport are extremely small and may well be fully embraced within existing non-distance-sensitive compensation arrangements.

Q. Please explain.

A. At page 23 of his direct testimony, Mr. Ruscilli states that "[i]n the Lake City example, reciprocal compensation would only apply for the use of BellSouth's facilities within the Lake City local calling area. That is, reciprocal compensation would apply to the facilities BellSouth used within its Lake City local network to transport and switch an ALEC originated call. Reciprocal compensation does not include the facilities to haul the traffic from Lake City to Jacksonville." And at page 24, he states that "[c]learly, the FCC expects ALECs to pay the *additional costs* that it [sic] causes BellSouth to incur" (emphasis supplied).

So what are these "additional costs" that Mr. Ruscilli believes that ALECs should pay? He describes them at page 25 of his direct testimony:

> The appropriate rates for the use of BellSouth's facilities to haul calls back and forth between the ALEC's point of interconnection and the local calling area of the originating and terminating points of the call are the interconnection rates for dedicated DS1 interoffice transport (per mile) and the facility termination charges. ... in the generic UNE cost docket (Docket No. 990649-TP), BellSouth proposed a rate of $.20 per mile and $92.62 per facility termination for dedicated DS1 interoffice transport.

Q. Do you agree that (assuming these rates are ultimately adopted) these represent the "additional costs" of transport beyond a BellSouth local calling area?

A. No. Assuming that the *average* per-minute rate for transport and termination does not already cover LATA-wide transport distances, then at the very most, only the per-mile charge would apply, since a facility termination is required for a dedicated interoffice transport facility whether it is wholly confined within a single local calling area or runs between two different local calling areas. Hence, the facility termination is in no sense an "additional" transport cost. Second, Mr. Ruscilli has quoted the rate for a DS1 facility rather than for a DS3 facility, which ALECs are probably more likely to use. In the same UNE cost docket, BellSouth proposed a monthly per-mile DS3 rate of $4.17.

Q. What does that translate into when expressed on a per-minute of use basis?

A. A DS3 facility has a capacity of 672 DS0 (voice-equivalent) channels. When used for common carrier interconnection, each channel likely carries something in the range of 12,000 minutes per month. Hence, a fully-loaded DS3 would be capable of carrying about 8-million minutes per month. At $4.17 per mile, that works out to $0.000000517 per mile per minute (that's about 5 one-hundred-thousandths of a penny per mile per minute). As for Mr. Ruscilli's concern about who will pay for the cost of hauling traffic over the 60 or so miles from Lake City to Jacksonville, the cost per minute for that traffic would work out to $0.000031, that is, about 3 one-thousandths of a penny per minute. Elsewhere in his testimony (at page 19), Mr. Ruscilli suggested that, but for the LATA restriction, ALECs might demand that BellSouth haul their traffic from "Lake City all the way to Miami, at no cost to the ALEC." The "cost" that even this irrelevant example would amount to for the roughly 330 mile trip is only $0.00017, i.e., 17 one-thousandths of a penny per minute. I do not believe that there is any basis on the record in this proceeding by which the Commission can affirmatively determine that this almost immeasurably small $0.000031 "additional" transport cost is not in fact already fully embraced within the existing tandem reciprocal compensation rate.

Q. Were ALECs willing to pay these transport costs, or if it turns out that they are already paying them, should they then be entitled to reciprocal compensation on calls originated in one ILEC local calling area and terminated in another?

A. As I have already stated, it is less than obvious that ALECs are not already paying these costs. In any event, if the ILEC's transport costs are fully compensated, there is no basis whatsoever for the ILEC to refuse to pay reciprocal compensation on calls it originates that are terminated to an ALEC.

By insisting that their definitions as to what calls are "local" and what are "toll" be controlling, BellSouth and Verizon are attempting to force ALECs to mirror the ILECs' monopoly era pricing practices when ALECs are prepared to create service offerings and pricing plans that will bring the kinds of massive cost decreases that are discussed in the *Scientific American* article to Florida consumers. It is critical that the Commission recognize that the ILEC local/toll distinctions and local calling area definitions are entirely matters of *price*, not of cost or network architecture. These concepts are artifacts of the past, and it is essential that the competitive marketplace be permitted to operate so as to replace these artificial service distinctions and pricing schemes with offerings that capture the actual cost of providing the service.

Q. How does the ILECs' position force ALECs to mirror ILEC pricing and service arrangements?

A. If ALEC costs and compensation arrangements are linked to existing ILEC pricing practices, ALECs will be forced to reflect those conditions in their own end user pricer. For example, if an ALEC-originated call traverses a route that is subject to toll rate treatment in ILEC tariffs, the ILECs may not view the ALEC call as local and on that basis make it subject to access charges. If an inbound (ILEC-originated) call to an ALEC customer traverses an ILEC toll route, the ALEC would not (under the ILEC view) be entitled to any reciprocal compensation, and might instead be required to *pay* access charges to the ILEC. All that this policy would accomplish is to protect the ILECs' existing service and pricing arrangements from competition. ALECs are entitled under TA-96 to exchange all intraLATA traffic with ILECs on the basis of cost and to set their prices and design their services in whatever way they believe will best serve their own competitive position.

Q. In support of BellSouth's position that ALECs should be required to establish a POI in each BellSouth local calling area to which they want local interconnection, Mr. Ruscilli asserts that "BellSouth has a local network in each of the local calling areas it serves in Florida."[5] Do you agree with Mr. Ruscilli's characterization?

A. No. BellSouth has clearly organized its networks along LATA lines, not along "local calling area" lines. For example, as is demonstrated in Exhibit ____ (LLS-2) to my rebuttal testimony, all of BellSouth's end office switches in the Jacksonville LATA "home" on the Jacksonville local tandem switch. Some calls (both local and toll) may be routed via direct end office-to-end office trunking, but all other interoffice (local and toll) calls must be routed via the tandem. Mr. Ruscilli's statement appears to be driven by existing *pricing* practices rather than by the physical configuration of BellSouth's intraLATA networks:

> ... these networks are individual networks *in the sense that when a customer pays for local service in the Jacksonville local calling area, that is what the customer gets*. The customer does not get access to other distant local calling areas, at least not without payment of the appropriate fees.[6]

Not only does the network configuration shown in Exhibit ____ (LLS-2) belie the notion that BellSouth operates a separate local network in each of its local calling areas, it underscores the fundamental efficiency of a network design in which all local and toll interoffice traffic is routed through a single

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5. Ruscilli (BellSouth), at 13.

6. *Id.*, at 16, emphasis supplied.

switching point. When a BellSouth customer in Lake City initiates an interoffice call – perhaps to a nearby exchange that is within the Lake City local calling area – that call may be routed directly if a direct end office-to-end office trunk is available, or would be routed via Jacksonville. In that case, BellSouth needs to haul the call the 60 miles from Lake City to Jacksonville and then haul it back roughly the same distance to the nearby exchange. The reason why this network architecture is so efficient is because the costs of transport are so small. But it also means that the cost to BellSouth of a "local" call (i.e., one that is subject to local rate treatment) is substantially the same as the cost to BellSouth of a toll-rated call. ALECs should be confronted with a comparable cost structure, whether they own their own network facilities, use BellSouth's, or some combination of the two.

Q. Hasn't this Commission required an ALEC to pay the ILEC the costs of dedicated transport of an ILEC-originated call from the ILEC's local calling area to the ALEC's POI?

A. Yes, on one occasion. This is an issue that has arisen before this Commission in a number of recent arbitrations. In the Level 3/BellSouth arbitration, Docket No. 000907-TP, the Commission concluded "... that BellSouth has failed to demonstrate a clear, argument that the parties should compensate each other for the use of interconnection trunks if those trunks are used to deliver traffic to a POI outside the local calling area from which the call originated."[7] The Commission also concluded that BellSouth had not met its burden to sustain its position that Level 3 should be required to pay BellSouth for the use of BellSouth's interconnection trunks on BellSouth's side of the POI.[8] Subsequently, in the MCI WorldCom/BellSouth arbitration in Docket No. 000649-TP, the Commission found the record to be inadequate to resolve this issue and concluded that the issue would be addressed in this generic docket.[9] However, on April 17, 2001, the Commission approved a staff recommendation in the Sprint Communications Limited Partnership/ BellSouth arbitration in Docket No. 000828-TP which reflects a departure from prior Commission orders and, for that matter, from FCC rules and orders.

Q. What decision did the Commission reach in the Sprint/BellSouth arbitration?

A. While the order has not yet been issued, the decision made by the Commission on April 17, 2001, approving the April 5, 2001 Staff Recommendation, requires Sprint to pay TELRIC rates for interoffice dedicated transport between a virtual POI designated by Sprint in the BellSouth local calling area and Sprint's actual POI in the LATA where

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7. Order No. PSC-01-0806-FOF-TP issued March 27, 2001, at 25.

8. *Id.*

9. Order No. PSC-01-0824-FOF-TP issued March 30, 2001, at 82.

Sprint has a NPA/NXX homed in the BellSouth local calling area and has assigned numbers from that NPA/NXX. The Staff Recommendation approved by the Commission would not have Sprint pay BellSouth for so-called "typical" activities associated with transporting such calls from BellSouth's local calling area to the Sprint POI, such as multiplexing and interoffice local transport.

Q. Do you agree with the Staff recommendation that was approved by the Commission in the Sprint/BellSouth arbitration?

A. No. While obviously the Sprint/BellSouth decision is based upon a different record, and the final order has not yet been issued and may be revisited on reconsideration, there are a number of reasons why the Sprint/BellSouth decision should not be controlling in this generic docket.

First, the Sprint/BellSouth decision was based upon a different record. The Staff evidently believed that the record in that case, contrary to the records in the Level 3/BellSouth and MCI WorldCom/BellSouth cases, showed that BellSouth incurred additional costs to haul a BellSouth originated call from the BellSouth local calling area to the Sprint POI. There is no ILEC-specific cost data to that effect that has been submitted in this proceeding.

Second, the Staff relied upon paragraph 176 of the FCC's *Local Competition Order*[10] for its conclusion that TA-96 requires distinct charges for interconnection and transport and termination. That same argument was made by BellSouth in the MCI WorldCom/BellSouth arbitration and was apparently not viewed by the Commission to be persuasive.[11] Obviously, there has been no FCC ruling since this Commission's MCI WorldCom/ BellSouth arbitration decision that would justify a different conclusion. The important point is that the FCC has already ruled that an ILEC may not charge an ALEC for either the facilities used to deliver ILEC-originated traffic or transport charges for the traffic itself on the ILEC side of the POI.[12]

Third, the Staff Recommendation in the Sprint/BellSouth arbitration was predicated upon a new and, I would submit, erroneous, interpretation of FCC Rule 51.703(b). That rule precludes a LEC from assessing "charges on any other telecommunications carrier for local telecommunications traffic that originates on the LEC's network." Staff (and the Commission) interpreted that rule to preclude BellSouth from assessing charges for facilities used to

10. In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers, *First Report and Order*, 11 FCC Rcd 15499 (1996).

11. Order No. PSC-01-0824-FOF-TP, at 77.

12. *In the Matters of TSR Wireless, LLC, et al. v. US West Communications, Inc.*, Memorandum Opinion and Order, File Nos. E-98-13, E-98-15, E-98-16, E-98-17, E-98-18, released June 21, 2000, at ¶25.

transport BellSouth originated traffic within the local BellSouth calling area but not outside of the BellSouth local calling area. To reach that conclusion, Staff imported BellSouth's definition of a local calling area into the rule even though there is no reference in the rule to the local calling area of an ILEC or ALEC. There is nothing in the rule that limits its application to the ILEC local calling area and, indeed, an interpretation of that nature undermines the very purpose of TA-96, which is to foster local service competition by, for example, encouraging innovative and different local calling areas and local calling plans.

Finally, it appears that the Staff and/or the parties in the Sprint arbitration did not heed the FCC's statements in paragraph 1062 of the August 1996 *Local Competition Order*. There the FCC was specifically addressing the question of cost responsibility for "transmission facilities that are dedicated to the transmission of traffic between two networks." That is precisely the situation at issue here, where traffic originating at some ILEC end office has to be transmitted to an ALEC for completion. The FCC specifically found that the "interconnecting carrier" – that is, the carrier receiving the traffic – "should not be required to pay the providing carrier" – that is, the one sending the traffic and putting in the facility to do it – "for one-way trunks ... which the providing carrier owns and uses to send its own traffic to the interconnecting carrier." In case two-way trunks are installed by the providing carrier, then the cost should be based "on the proportion of traffic that the interconnecting carrier" – here, the ALEC – "uses to send terminating traffic to the providing carrier." The point is that the FCC has already concluded that it is the responsibility of the carrier originating the traffic to get that traffic to the carrier terminating it. Combined with the fact that, unlike ILECs, ALECs are not obliged to permit interconnection "at any technically feasible point," the only sensible conclusion is that the originating ILEC, not the ALEC, is responsible for getting its traffic all the way from the end office where the traffic originates to the ALEC's POI.

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

A. Yes, it does.

Exhibit ___ (LLS-1)

"The Triumph of the Light"

Scientific American

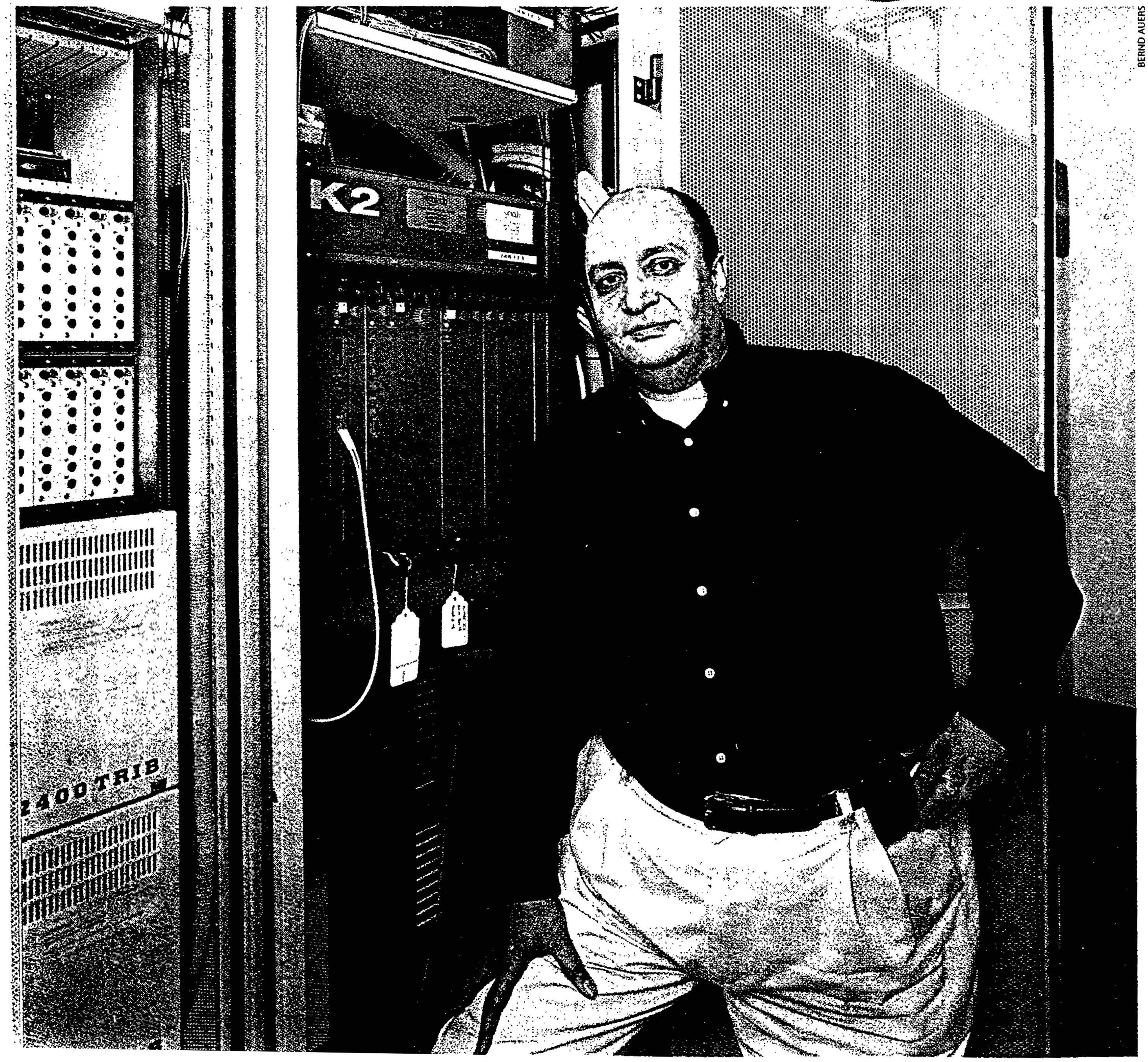
January 2001

Docket No. 000075-TP
Exhibit __ (LLS-1)

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

by Gary Stix, *staff writer*

THE TRIUMPH OF THE LIGHT



BERND AUERS

Docket No. 000075-TP
Exhibit ___ (LLS-1)

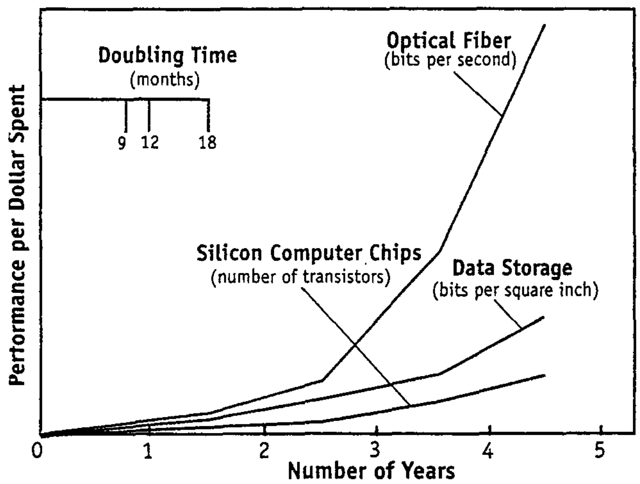
Was it Britney Spears or Fatboy Slim? The network administrators at Kent State University had not a clue. All they did know last February was that "Rockafeller Skank" and thousands of other downloading hits had gotten intermingled with e-mails from the provost and research data on genetic engineering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

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

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

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

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



CLEO VILETT; SOURCE: VINOD KHOSLA *Kleiner Perkins Caufield & Byers*

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

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

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

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

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

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

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

And Then There Was Light

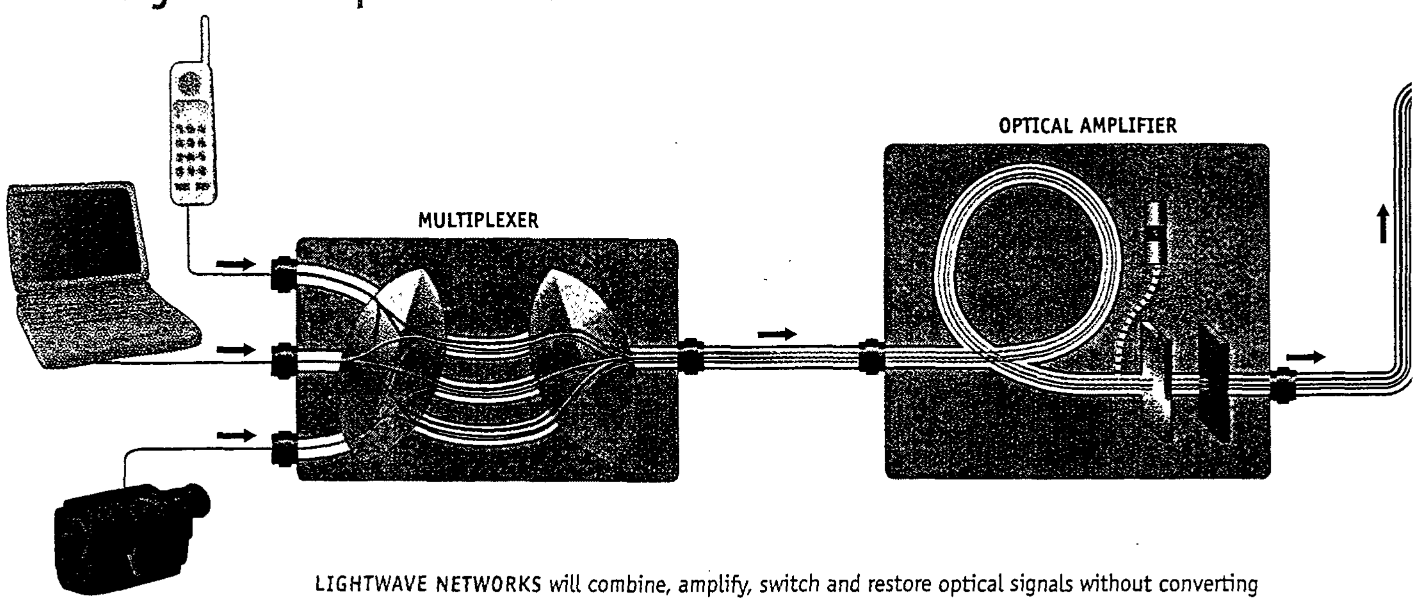
Prospects of limitless bandwidth—the basis for speculations about networked virtual reality and high-definition videos—are of relatively recent vintage. AT&T and GTE deployed the first optical fibers in the commercial communications network in 1977, during the heyday of the minicomputer and the infancy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

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

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

DWDM set off a bandwidth explo-

Technologies for All-Optical Networks



LIGHTWAVE NETWORKS will combine, amplify, switch and restore optical signals without converting them to an electronic transmission for processing. A dense wavelength division multiplexer (DWDM) will take different wavelengths of light and place them on a single fiber connection. An optical amplision. With the multiplexing technology, the capacity of the fiber expands by the number of wavelengths, each of which can carry more data than could be handled previously by a single fiber. Nowadays it is possible to send 160 frequencies simultaneously, supplying a total bandwidth of 400 gigabits a second over a fiber. Every major telecommunications carrier has deployed DWDM, expanding the capacity of the fiber that is in the ground and spending what could be less than half of what it would cost to lay new cable, while the equipment gets installed in a fraction of the time it takes to dig a hole.

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

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

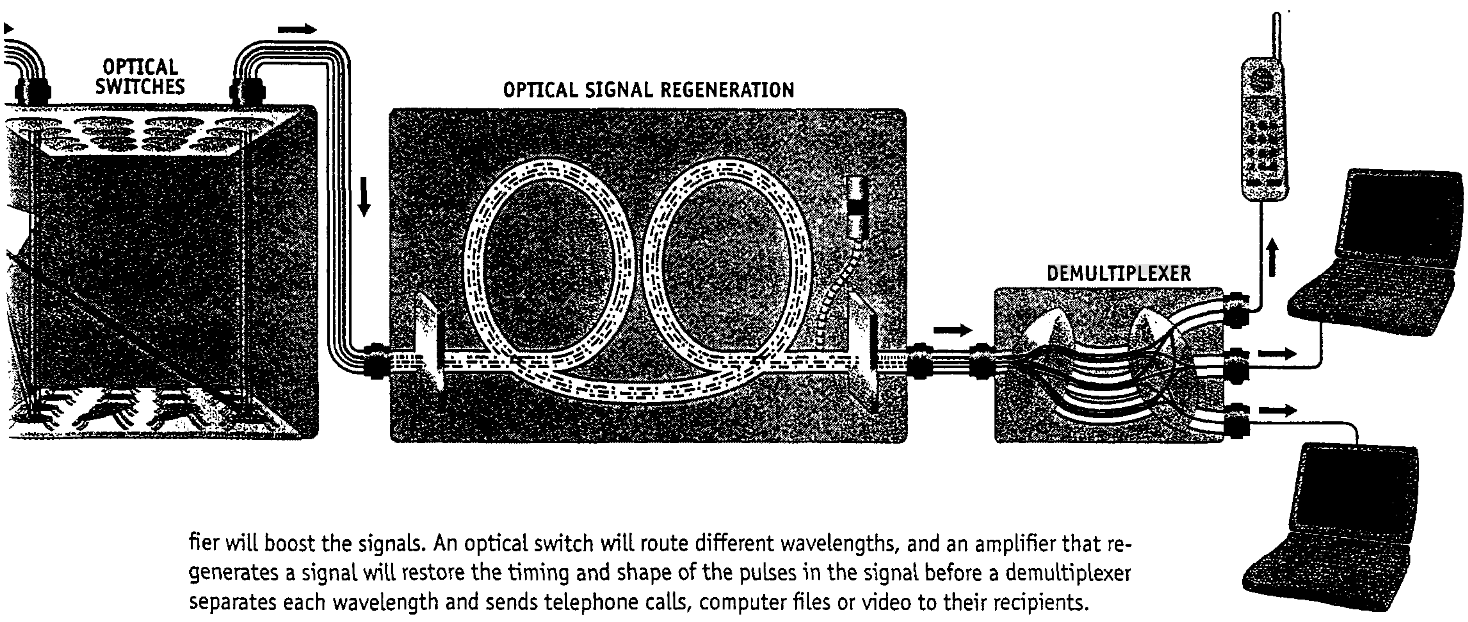
The cost and complexity of electronic switching have prompted a mad scramble to find a means of redirecting either individual wavelengths or the entire light signal in a fiber from one pathway to another without the optoelectronic conversion. Research teams, often inhabiting tiny start-ups, fiddle with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

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

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

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

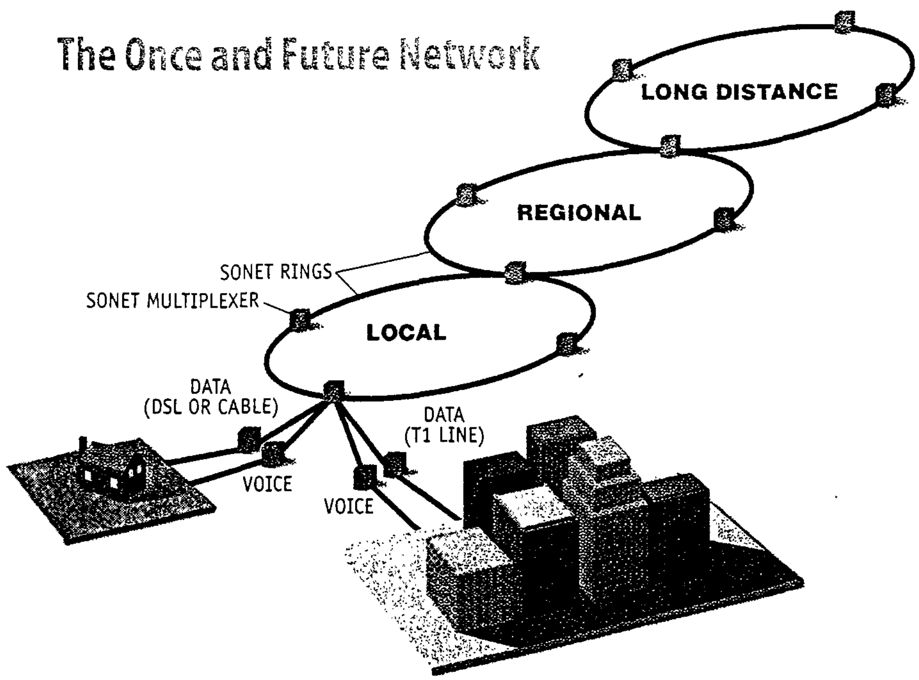
With the advent of optical packet switching, individual packets will still need to get read and routed at the edges of optical networks—on local phone networks near the points where they are sent or received. For the moment, that task will still fall to electronic routers from companies such as Cisco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



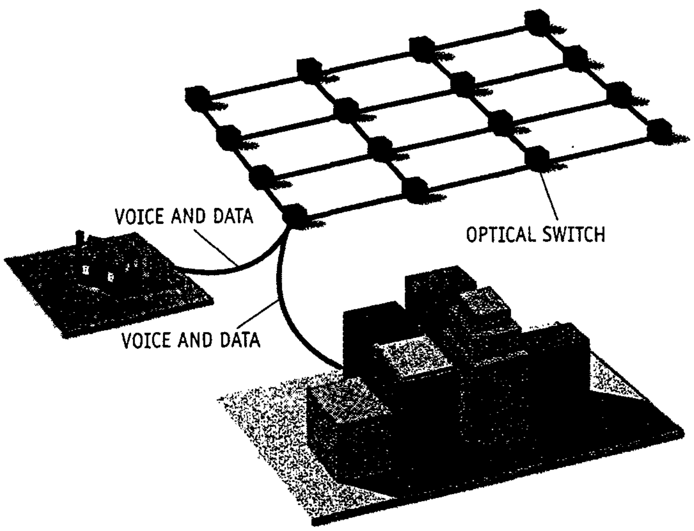
fier will boost the signals. An optical switch will route different wavelengths, and an amplifier that regenerates a signal will restore the timing and shape of the pulses in the signal before a demultiplexer separates each wavelength and sends telephone calls, computer files or video to their recipients.

Docket No. 000075-TP
Exhibit ___ (LLS-1)

The Once and Future Network



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



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

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

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

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

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

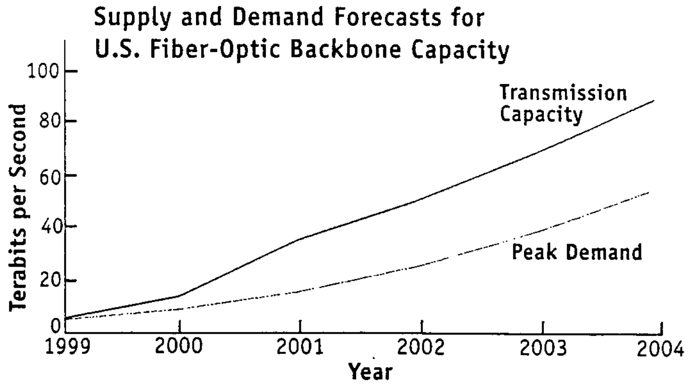
Home Light Pipes

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

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

LAURIE GRACE

Docket No. 000075-TP
Exhibit ___ (LLS-1)



SOURCE: ADVENTIS

FUTURE BANDWIDTH REQUIREMENTS

Applications	Backbone Bandwith (terabits per second)
Online virtual reality	1,000 to 10,000
3-D holography/telepresence	30,000 to 70,000
Metacomputing	50,000 to 200,000
Web agents	50,000 to 200,000

1 terabit = 1 trillion bits

SOURCE: CORNING

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

CLEO VILETT

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

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

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

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

Will Anybody Come?

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

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

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

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

Further Information

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

Exhibit ___ (LLS-2)

BellSouth Central Offices and
Tandem Switch Assignments
Jacksonville LATA

Local Exchange Routing Guide

April 2001

Docket No. 000075-TP
Exhibit __ (LLS-2)

BELLSOUTH END OFFICE AND TANDEM SWITCHES
LATA 452 - JACKSONVILLE, FL

LATA	END OFFICE/HA	TERM/FGD TANDEM	HOST	Host or Remote	
45204	JCVLFLCL21W00			H	JCVLFLCL21W00
45204	JCVLFLCL52W00			H	JCVLFLCL52W00
45204	JCVLFLCL53W00			H	JCVLFLCL53W00
45204	JCVLFLCL55T00			H	JCVLFLCL55T00
45204	JCVLFLCL61W00			H	JCVLFLCL61W00
45204	JCVLFLCL62W00			H	JCVLFLCL62W00
45204	JCVLFLCL63W00			H	JCVLFLCL63W00
45204	JCVLFLSM01T00			H	JCVLFLSM01T00
45204	JCVLFLSM21W00			H	JCVLFLSM21W00
45204	STAGFLMA61W00			H	STAGFLMA61W00
45204	FRBHFLFPDS000	JCVLFLCL05T		H	FRBHFLFPDS000
45204	GCSPFLCNDS000	JCVLFLCL05T		H	GCSPFLCNDS000
45204	JCVLFLCL05T00	JCVLFLCL05T		H	JCVLFLCL05T00
45204	JCVLFLCLDS000	JCVLFLCL05T		H	JCVLFLCLDS000
45204	JCVLFLCLDS100	JCVLFLCL05T		H	JCVLFLCLDS100
45204	JCVLFLLF76E00	JCVLFLCL05T		H	JCVLFLLF76E00
45204	JCVLFLNODS000	JCVLFLCL05T		H	JCVLFLNODS000
45204	JCVLFLIARS000	JCVLFLCL05T	JCVLFLOWDS0	R	JCVLFLOWDS0
45204	FTGRFLMARS000	JCVLFLCL05T	JCVLFLOWDS0	R	JCVLFLOWDS0
45204	YULEFLMARS000	JCVLFLCL05T	JCVLFLOWDS0	R	JCVLFLOWDS0
45204	JCVLFLOWDS000	JCVLFLCL05T		H	JCVLFLOWDS000
45204	JCVLFLRV38E00	JCVLFLCL05T		H	JCVLFLRV38E00
45204	BLDWFLMARS000	JCVLFLCL05T	JCVLFLWCDS0	R	JCVLFLWCDS0
45204	MXVLFLMARS000	JCVLFLCL05T	JCVLFLWCDS0	R	JCVLFLWCDS0
45204	JCVLFLWCDS000	JCVLFLCL05T		H	JCVLFLWCDS000
45204	LKCYFLMADS000	JCVLFLCL05T		H	LKCYFLMADS000
45204	MDBGFLPMDS000	JCVLFLCL05T		H	MDBGFLPMDS000
45204	ORPKFLMADS000	JCVLFLCL05T		H	ORPKFLMADS000
45204	ORPKFLRWDS000	JCVLFLCL05T		H	ORPKFLRWDS000
45204	PMPKFLMARS000	JCVLFLCL05T	PLTKFLMADS0	R	PLTKFLMADS0
45204	WELKFLMARS000	JCVLFLCL05T	PLTKFLMADS0	R	PLTKFLMADS0
45204	PLTKFLMADS000	JCVLFLCL05T		H	PLTKFLMADS000
45204	JCBHFLMA24E00	JCVLFLSM01T		H	JCBHFLMA24E00
45204	JCVLFLARDS000	JCVLFLSM01T		H	JCVLFLARDS000
45204	JCBHFLABRS000	JCVLFLSM01T	JCVLFLBWDS0	R	JCVLFLBWDS0
45204	JCBHFLSPRS000	JCVLFLSM01T	JCVLFLBWDS0	R	JCVLFLBWDS0
45204	JCVLFLBWDS000	JCVLFLSM01T		H	JCVLFLBWDS000
45204	JCVLFLFCDS000	JCVLFLSM01T		H	JCVLFLFCDS000
45204	JCVLFLSJ73E00	JCVLFLSM01T		H	JCVLFLSJ73E00
45204	JCVLFLSMDS000	JCVLFLSM01T		H	JCVLFLSMDS000
45204	MNDRFLAVDS000	JCVLFLSM01T		H	MNDRFLAVDS000
45204	STAGFLWGRS000	JCVLFLSM01T	MNDRFLLODS0	R	MNDRFLLODS0
45204	JCVLFLJTRS000	JCVLFLSM01T	MNDRFLLODS0	R	MNDRFLLODS0
45204	MNDRFLLWRS000	JCVLFLSM01T	MNDRFLLODS0	R	MNDRFLLODS0
45204	MNDRFLLODS000	JCVLFLSM01T		H	MNDRFLLODS000
45204	PNVDFLMADS000	JCVLFLSM01T		H	PNVDFLMADS000
45204	STAGFLBSRS000	JCVLFLSM01T	STAGFLMADS0	R	STAGFLMADS0
45204	STAGFLSHRS000	JCVLFLSM01T	STAGFLMADS0	R	STAGFLMADS0
45204	STAGFLMADS000	JCVLFLSM01T		H	STAGFLMADS000