BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In 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

DIRECT TESTIMONY OF

HOWARD LEE JONES

ON BEHALF OF

VERIZON FLORIDA INC.

MARCH 12, 2001

DIRECT TESTIMONY OF HOWARD LEE JONES

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Howard Lee Jones and my business address is 600 Hidden Ridge, Irving, Texas 75038.

Q. ARE YOU THE SAME HOWARD JONES WHO SUBMITTED DIRECT AND REBUTTAL TESTIMONY ON BEHALF OF VERIZON FLORIDA INC. IN PHASE I OF THIS PROCEEDING?

A. Yes.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I will address Phase II issue number 11, which asks what types of local network architectures are currently employed by incumbent local exchange carriers (ILECs) and alternative local exchange carriers (ALECs), and what factors affect their choice of architectures. I understand this is an informational issue for the Commission, and that it requires no Commission action.

Q. WHAT TYPES OF NETWORK ARCHITECTURES DOES VERIZON CURRENTLY USE FOR ORIGINATION OF CALLS?

A. Verizon employs primarily analog copper loop customer premise connections to circuit switches or end offices located roughly every three to five miles apart. Almost half the time, the copper loops are "line-concentrated" at either a remote switching unit or a remote line unit before reaching their full-featured serving end office. The transport from these remote units to the end office is usually fiber optic time division multiplexed transport facilities, such as DS-1 or DS-3 facilities. In the case of copper loops directly reaching the end office, these are line-concentrated at the end office, rather than remotely. In both cases, approximately four customer loops share one call path into the call switching equipment of the end office.

Verizon is a longstanding incumbent carrier of last resort, and its network is ubiquitous. As such, its network architecture has not grown from any single, comprehensive plan, but has evolved over many decades, taking in equipment and design factors appropriate to the time and mode of regulation. To the extent that network performance enhancement opportunities have been available and their costs justifiable over a long depreciation period, Verizon has implemented these enhancements without delay. But as I discuss later, the network architecture of an incumbent carrier should not be the only cost factor considered in the determination of an appropriate methodology for reciprocal compensation; the cost of the ALEC's network must be considered, as well.

Q. **WHAT TYPE OF NETWORK ARCHITECTURE DOES VERIZON USE TO TRANSPORT CALLS BETWEEN END OFFICE SWITCHES SERVING END USERS?**

A. Within and between metropolitan areas, inter-office transport is generally provided over fiber-optic self-healing rings. Fiber optic facilities will also likely be used in rural or less densely populated areas, but the inter-office route will be point-to-point transport without the self-healing ring configuration. In both metropolitan and rural areas, many of the transport links will be direct interoffice routes with no intermediate or tandem switching points. In other words, traffic originated in Hyde Park will go directly to Temple Terrace.

Q. WHEN ARE TANDEM SWITCHES USED?

A. Tandem, or intermediate, switches do not serve end users and are used primarily as overflow switching points when direct trunks are fully occupied. Tandem switches are also used as intermediate switching points if the end office pairs (originating office and terminating office) do not have enough traffic to justify the 24-path DS-1 direct trunks. Tandem switches will have an average of 40 - 50 subtending end offices and serve as either local only or toll and local tandems. It is important to note that tandem switches, by definition, only switch traffic between their subtending end offices or the end offices of ALECs. So if a company is not providing switching between two or more separate and distinct local end offices, it is not performing a tandem function.

Q. WHAT KIND OF NETWORK ARCHITECTURE DOES VERIZON USE TO DELIVER CALLS TO ISPS?

A. The attached schematic, (Ex. HLJ-3) shows the "ILEC PRI Model," which applies when the ISP is served solely by Verizon. On the left side of the schematic are multiple Verizon end offices with many alternative routes for traffic to reach the ISP premise on the right side of the vertical bar. Ultimately, in most cases, Verizon will route the traffic to the ISP premise based upon efficient traffic engineering principles from a single end office, even though the traffic could potentially traverse a widely distributed set of intermediate transport paths. The service to the ISP premise will most likely be an end office trunk based multi-line loop of either copper DS-1 or fiber optic DS-3 facility.

Q. IS THE ILEC PRI MODEL THE ONLY NETWORK ARCHITECTURE VERIZON USES TO SERVE ISPS?

A. No. The CyberPOP model shown in Exhibit HLJ-4 is the other common architecture allowing Verizon to provide service to ISPs. CyberPOP is a federally tariffed service providing ISPs a dial-up modem and connection to Verizon's switch. With CyberPOP service, the ISP obtains special access to transport packetized dial-up traffic to an interexchange carrier or internet backbone network.

Q. WHAT CONCLUSIONS CAN BE DRAWN FROM THE VERIZON NETWORK SCHEMATICS?

A. Exhibits HLJ-3 and HLJ-4 both show how Verizon manages the routing of high-volumes of traffic from a carrier's network destined for a specific location. In the ILEC PRI model (Ex. HLJ-3), the objective is to connect the end office switch with the dial-up modems handling high volumes of traffic. This is accomplished by aggregating all dial-up traffic bound for a given ISP from the ILEC's dispersed network to a single point and then routing this traffic to the dial-up modems over a facility that is designed to efficiently accommodate a high volume of traffic. The same holds true for the CyberPOP model (Ex. HLJ-4), except that the connection to the internet backbone is accomplished directly, without an ISP premise.

Q. WHAT TYPE OF FACILITY ARRANGEMENT IS TYPICALLY USED TO TRANSPORT TRAFFIC FROM THE ILEC'S END-OFFICE SWITCH TO THE ISP'S DIAL-UP MODEMS?

A. Since the traffic is highly concentrated and one-directional, the typical ISP serving arrangement is a trunk-to-trunk type of network configuration. These trunk-to-trunk arrangements are very different than the network architecture used to serve residential and small-to-medium sized businesses.

Q. ARE THERE OTHER REASONS WHY ISPS PREFER TO BE SERVED BY A TRUNK TO TRUNK ARRANGEMENT SUCH AS ISDN PRI?

A. Yes. There are customer service issues that would make ISDN PRI desirable. For example, ISDN PRI allows the ISP to provide connectivity to its dial-up customers at speeds up to 56 kbps, whereas an ordinary business line connection will not. Since 56 kbps modems are the most widely used method of connecting on a dial-up basis, it would be detrimental to an ISP's service level if it could not meet this customer demand.

Q. DO THE ALECS USE NETWORK ARCHITECTURES SIMILAR TO

THOSE OF THE ILEC?

A. The ALECs, of course, are the only entities with firsthand knowledge of their network architecture choices, so the Commission should seek comprehensive answers directly from them on this point. I can, however, make certain general observations about ALEC network architecture, based upon industry publications and my knowledge of industry network design practices and equipment efficiencies available to carriers that may have a relatively high proportion of Internet-bound traffic to traditional voice traffic. I would advise the Commission to view with skepticism ALEC claims that their networks are similar to the ILECs' networks; in fact, very different factors affect the ILECs' and ALECs' choice of network architecture.

ALECs that target specific customer sets, like ISPs, will deploy different architectures that can most efficiently serve those customers. As an example to demonstrate ALEC network architecture, I have diagrams and information obtained from NaviNet industry forum presentations (Ex. HLJ-5, Mar. 1, 2000 NaviNet Presentation; Ex. HLJ-6: Sept. 14, 1999 NaviNet Presentation.) NaviNet is a firm that acts as a broker between ISPs and ALECs to establish network architectures using SS7 Gateways.

Q. **WHAT DOES DIAGRAM 1 (BATES-STAMPED PAGE 183) IN EX. HLJ –5 SHOW?**

A. This diagram shows a joint provisioning of ISP service by the ILEC and the ALEC.

- The left side of the diagram shows the ILEC origination, multiple switching and transport of the ISP call.
- The middle part shows the ALEC end office which serves the ISP premise. The trunks labeled "IMT" (inter-machine trunks) go from the ILEC end office or tandem directly to the Remote Access Server (RAS) or dial-up modem, thus bypassing the ALEC switch.
- The right side shows the ISP dial-up modems. In this diagram, the ILEC switch is replaced as the end office serving the ISP when compared to Exhibit HLJ-3 that I discussed earlier.

Q. WHAT DOES DIAGRAM 2 (BATES-STAMPED PAGE 183) IN EX. HLJ –5 SHOW?

A. Diagram 2 shows a form of joint provisioning of ISP service with trunk-to-trunk switching between the ILEC and ALEC utilizing SS7 signaling.

Q. WHAT DO THE NETWORK ARRANGEMENTS SHOWN IN THE DIAGRAMS IN EXHIBIT HLJ-5 INDICATE?

A. The diagrams in Exhibit HLJ-5 demonstrate that ALECs have different ways to manage high volume traffic destined for the dial-up modems of ISPs. Some of these methods, such as that shown in Diagram 1, at page 183 of Exhibit HLJ-5, involve the complete bypass of the CLEC's switch. Other methods, such as that shown on the bottom of Diagram 2 at page 183, Exhibit HLJ-5, involve the use of traffic management techniques, such as trunk-to-trunk switching utilizing SS7 signaling. Both diagrams show the kinds of traffic management tools available and actively marketed to ALECs today.

Q. DO CLECS, IN FACT, USE THESE ALTERNATIVE METHODS OF TRAFFIC MANAGEMENT?

A. The Sept. 14, 1999 NaviNet presentation included as Exhibit HLJ-6 shows, on Bates-stamped page 195, a deployment status of ten POPs, with 6,000 to 12,000 ports per POP. Therefore, we can be reasonably sure the ALEC clients of this broker can and do make use of this network architecture.

Q. WHAT FACTORS WOULD INFLUENCE AN ALEC'S DECISION ON THE TYPE OF NETWORK ARCHITECTURE TO DEPLOY?

A. The primary factor driving the determination of network deployment would be the business plan of the ALEC. ALECs who target ISPs serving dial-up customers would likely deploy an architecture that is designed to efficiently handle a high volume of one directional traffic. As demonstrated by Diagram 3, at page 187 of Exhibit HLJ-5, the cost of providing service to an ISP is significantly lower using inter-machine trunks ("IMTs") when compared to the use of ISDN PRIs. For example, the cost of providing service to an ISP, on a DS-0 basis, ranges from $0 to $22 per month when using inter-machine trunks ("IMTs"). This cost increases to $17-$43 a month per DS-0 when using ISDN PRI. Therefore, an ALEC that is targeting ISPs would most likely find the lower cost of provisioning service attractive and deploy SS7 based IMTs in their network architecture.

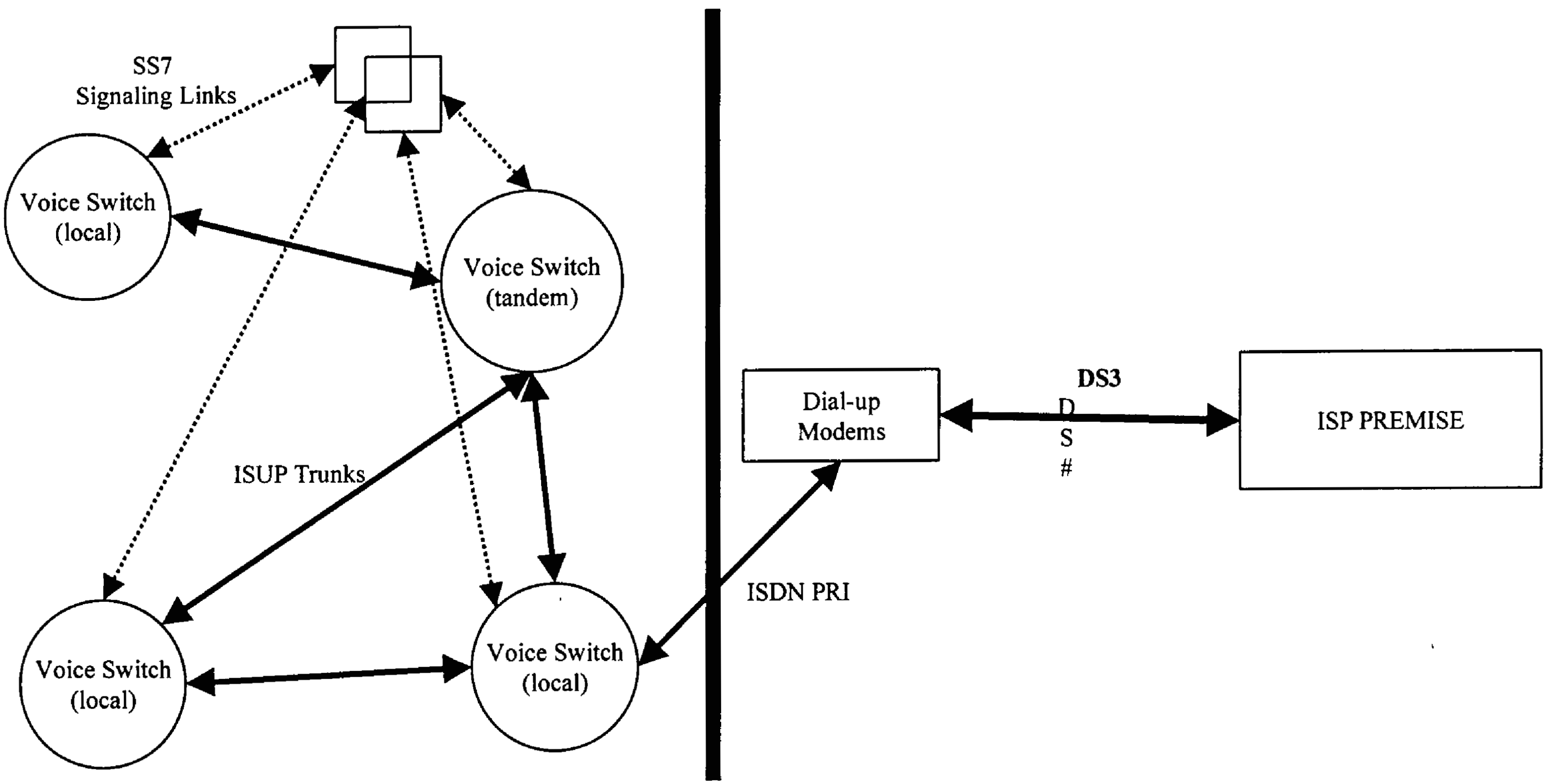
Q. CAN YOU PLEASE SUMMARIZE YOUR TESTIMONY?

A. ALECs and ILECs can be expected to have different types of network architecture because their network choices have been driven by different factors. The ILEC, as the carrier of last resort, serves a dispersed and diverse array of customers. Its network has evolved over many decades, with design factors influenced by regulatory directives and the state of technology at particular points in time. ALECs, on the other hand, are free to focus on particular customer sets (for example, ISPs) and so will design their networks to most efficiently serve these particular customers. Their networks are all relatively new. The ALECs' newer and more efficient networks (for the customers served) can be expected to produce lower costs relative to the ILECs' networks. If the Commission chooses to establish a reciprocal compensation mechanism, it should consider the difference in networks and cost characteristics as between ALECs and ILECs.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes it does.

ILEC PRI Model



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CyberPOP Model

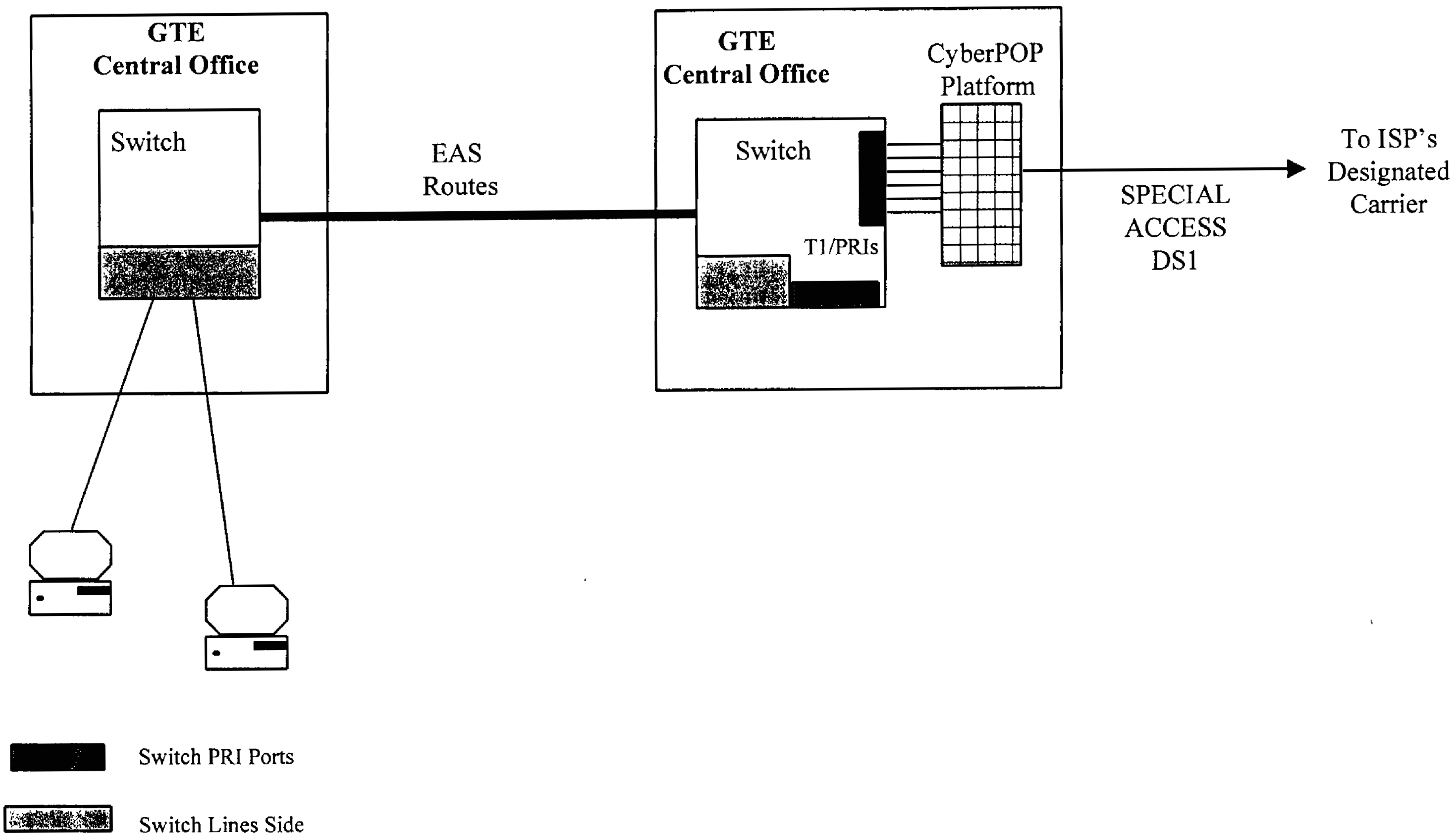

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Exhibit No. HLJ-4
FPSC Exhibit No. ____
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Jim Winkleman
CTO and VP Engineering
NaviNet, Inc.

Switch Bypass Case Study

NaviNet

March 1, 2000
Atlanta, GA
Telcordia ITESF12

NaviNet

Overview
NaviNet's Dialup Network - A Case Study

- Architecture
  - Connection to PSTN
  - IP and Internet Design
- Switch Bypass Advantages
- Switch Bypass Challenges
- Ideal Switch Bypass Deployment
- Value Added Services Enabled by SS7

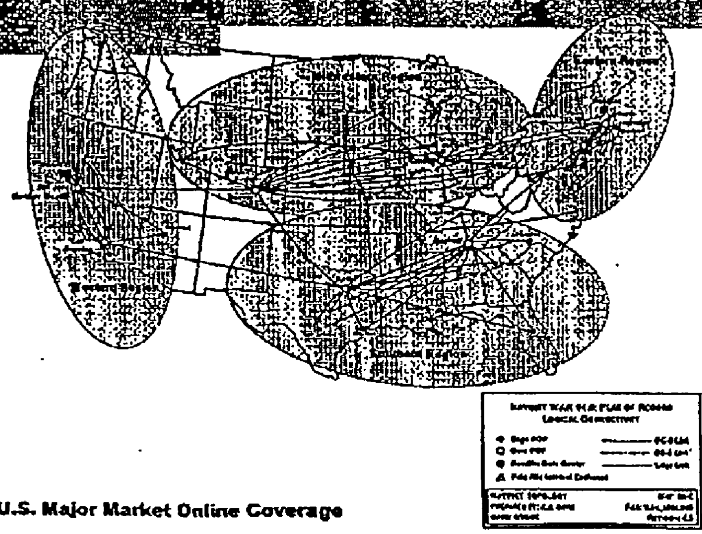
NaviNet

Connection to the PSTN - NaviNet's Architectural Goals, July 1997

- Reduce number of POPs: use "SuperPOP" CLEC call aggregation model
- Reduce costs: replace expensive PRIs with SS7 trunks and switch bypass
- Increase quality: reduce busy signals with capacity control and bypass of terminating switch
- Reduce strain on PSTN

NaviNet

Dial-Up POPs and Backbone



NaviNet U.S. Major Market Online Coverage

- Current Coverage 79%

DIAGRAM 1

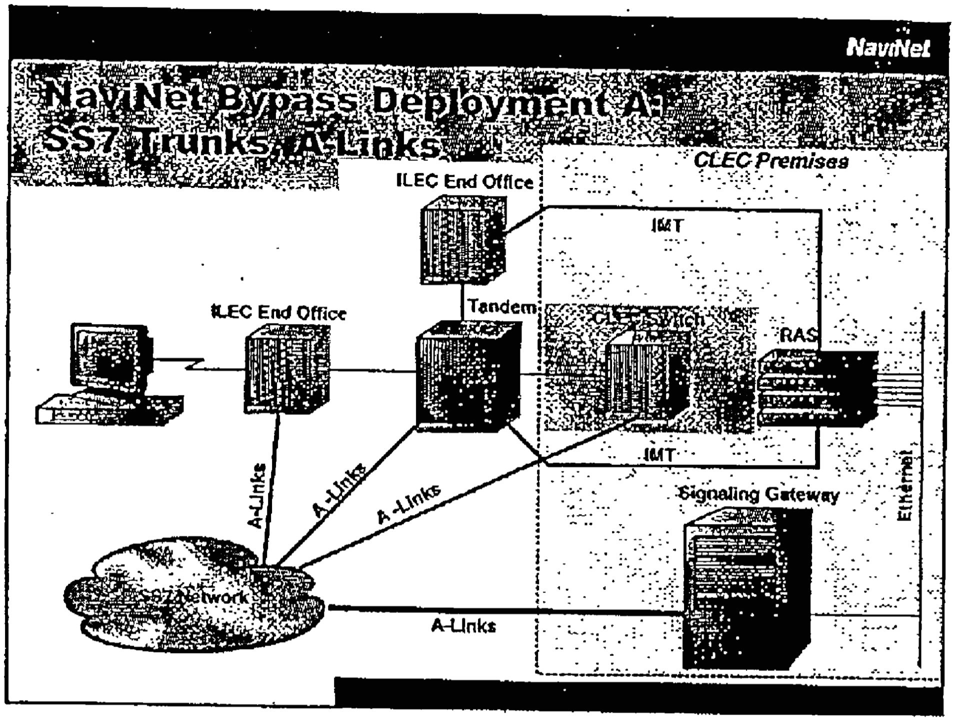
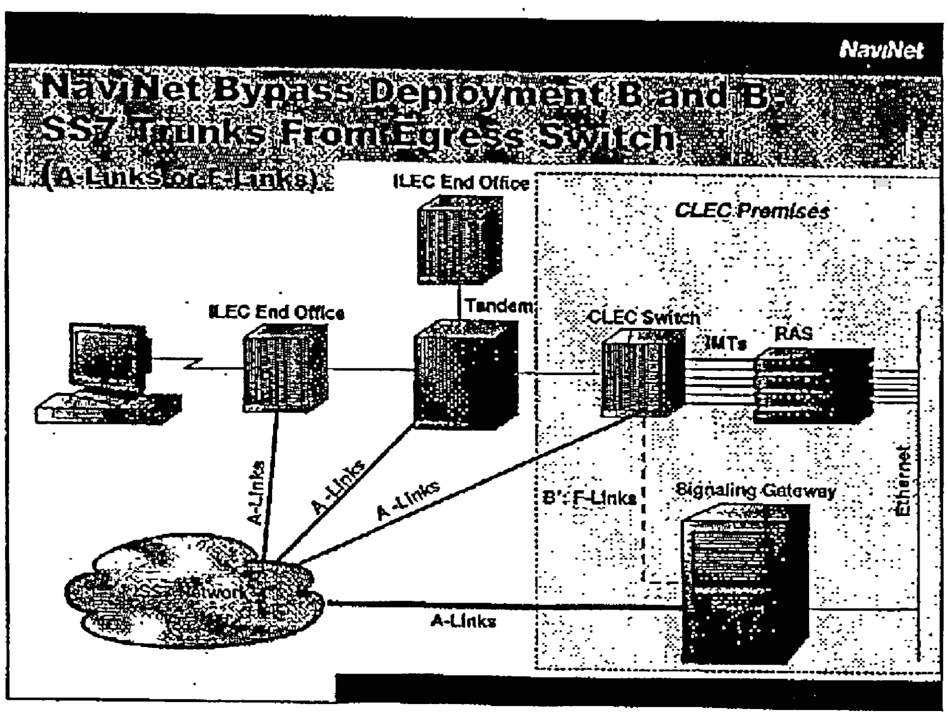
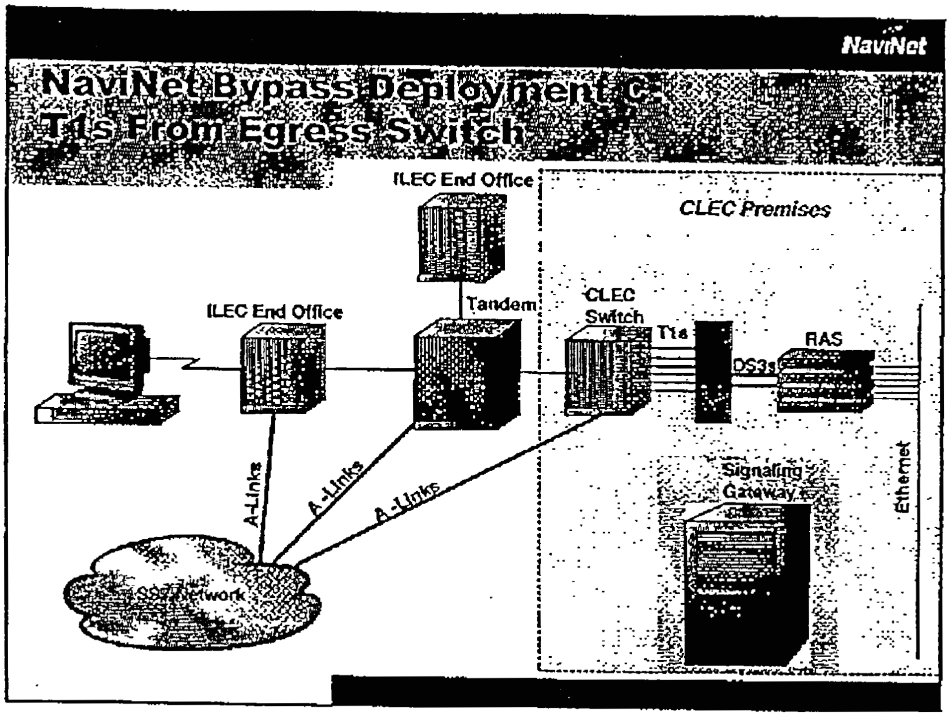
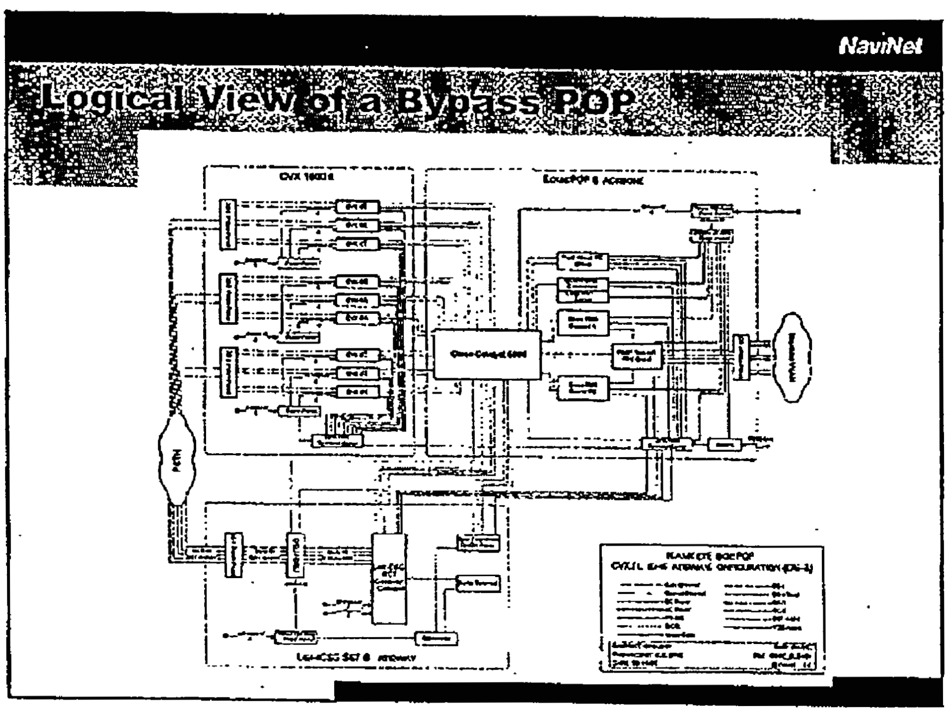


DIAGRAM 2




NaviNet
NaviNet Bypass Deployment C:
T1s From Egress Switch
ILEC End Office
CLEC Premises
Tandem
CLEC
Switch
T1s
RAS
ILEC End Office
DS3s
Signaling
Gateway
Ethernet
A-Links
A-Links
A-Links
SS7 Network


NaviNet
Logical View of a Bypass POP

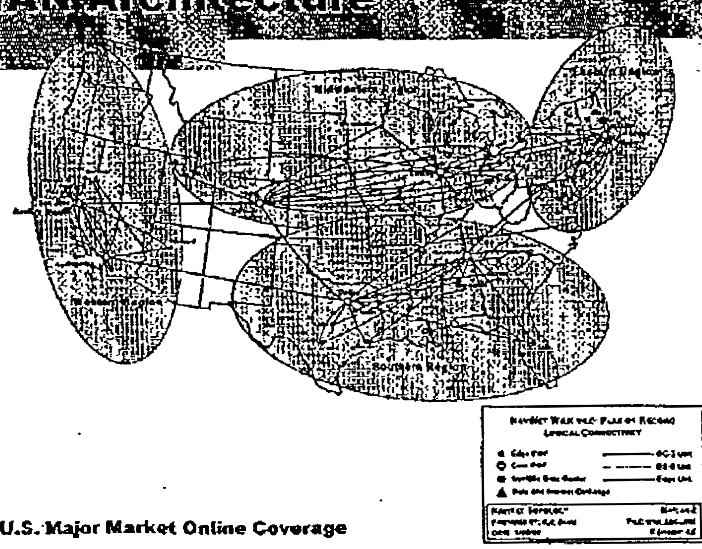
NavINet

Call Routing: LNP

- IN/AIN methods were non-starters
- We use 1 NPA-NXX for the LRN
- Port a block from each of CLEC's NPA-NXXs
- Port most of LRN NXX back to CLEC
- In some cases, dedicated NXXs

NavINet

IP WAN Architecture

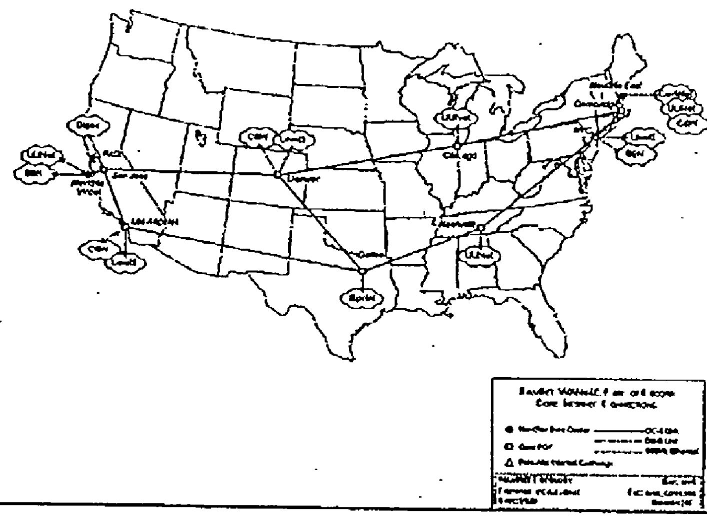


NavINet U.S. Major Market Online Coverage

- Current Coverage 79%

NaviNet

Internet Architecture



NaviNet

Switch Bypass Advantages: Overview

- Reduced Costs
  - No PRIs
  - Fewer, higher capacity POPs to build, connect, and operate
- Improved Quality
  - More granular capacity management
  - Fewer switches in call path

DIAGRAM 3

NaviNet

Switch Bypass Advantages - Reduced Costs

- PRIs:
  - $400 to $1000/mo. = $17 - $43/DS0/month
  - If changes in recip comp, PRIs could go as high as $2000/month = $87/DS0/month
- IMTs (typically DS3 over SONET or IXC)
  - $0 - $15,000/mo. = $0 - $22/DS0/month
  - Not sensitive to recip comp legislation
  - Recip comp as added revenue

NaviNet

Switch Bypass Advantages - Capacity Management

- PRIs: You must rely on CLEC to
  - trunk to right tandems for your business plan
  - manage capacity of IMTs and of voice switch
- Bypass
  - IMTs not shared with voice customers
  - Set of unique NPA-NXX-LXXXs for each ISP
    - Enables enforcement of capacity control policy...
    - ...which enables meaningful SLAs
  - No line side switch capacity to manage
  - End office trunking

NaviNet

Switch Bypass Challenges - Overview

- Capacity management challenges
- Cultural and skill set challenge of "convergence" technologies
- Additional costs

NaviNet

Switch Bypass Challenges - Capacity Management

- Idle capacity
  - IMTs
  - Remote Access Servers
  - No DS0 grooming
- Telco delivery times and "Internet Time"
- ...made worse by People Vs. Modems
- ILEC requirements for adding capacity

NaviNet

Switch Bypass Challenges - "Convergence" culture shock

- Telco delivery times and "Internet Time"
- Skill sets: PSTN/SS7/IP/Internet routing/WAN design/CLEC/ISP/NSP
- Differing network management philosophies

NaviNet

Switch Bypass Challenges: Additional Costs

- Idle capacity
  - IMTs
  - RAS ports
- Switch bypass gateways
- Administrative overhead

NaviNet

Ideal Switch Bypass Deployment

- big, Big, BIG, BIG, **BIG**
  - Lots of end users, e.g., wholesale provider
  - Nation-wide presence
  - Lots of interconnection agreements with many ILECs
- Ideal Interconnect Agreement
  - Single point of interconnection, OC48
  - Costs of trunks covered by ILEC (with low/no inbound termination fee)
  - Bill and Keep
- NPA-NXXs providing ubiquitous coverage

NaviNet

Value Added Services Enabled by SS7

- Now that you've got an SS7 capable IP network . . .
  - Internet Call Waiting
  - Overflow routing
  - PC-to-PC VoIP
  - PC-to-Phone VoIP
  - IN/AIN integration

Jim Winkleman
CTO and VP Engineering
NaviNet, Inc.

Switch Bypass Solutions in the Real World

NaviNet

September 14, 1999
Seattle, WA
Telcordia ITESF-10

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NaviNet's Business Goal: July/97

- Wholesale dial-up networking provider to ISPs
- Lowest cost basis, highest quality dial network
- NaviNet is a wholly-owned subsidiary of CMGI (2nd infrastructure company)

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NavINet

Strategy

- Rapidly build nationwide network using CLEC Partner Program
- Focus on wholesale business model
- Implement new dial architecture using emerging technologies

Dial Architecture

- "SuperPOP" call aggregation model
- Highly robust WAN with distributed Internet access
- Switch bypass technology
  - Eliminates PRIs
  - Increases capacity control
  - Dedicated IMT resources
  - Reduces strain on PSTN

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NaviNet

Current Deployment Status

90,000 ports

- Ten POPs cover 45% of potential U.S. Internet subscribers
- Initial deployment of ~ 6,000 to 12,000 ports per POP
- Target: 75% coverage by EOY '99

≈ 150,000 ports

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NaviNet

What We've Learned

- Convergence technology challenges:
  - Circuit/packet technology "gap"
  - Differing network management philosophies
  - Differing product development strategies
  - Differing cultures
- CLEC/ILEC coordination obstacles
- Bypass technology is no Silver Bullet

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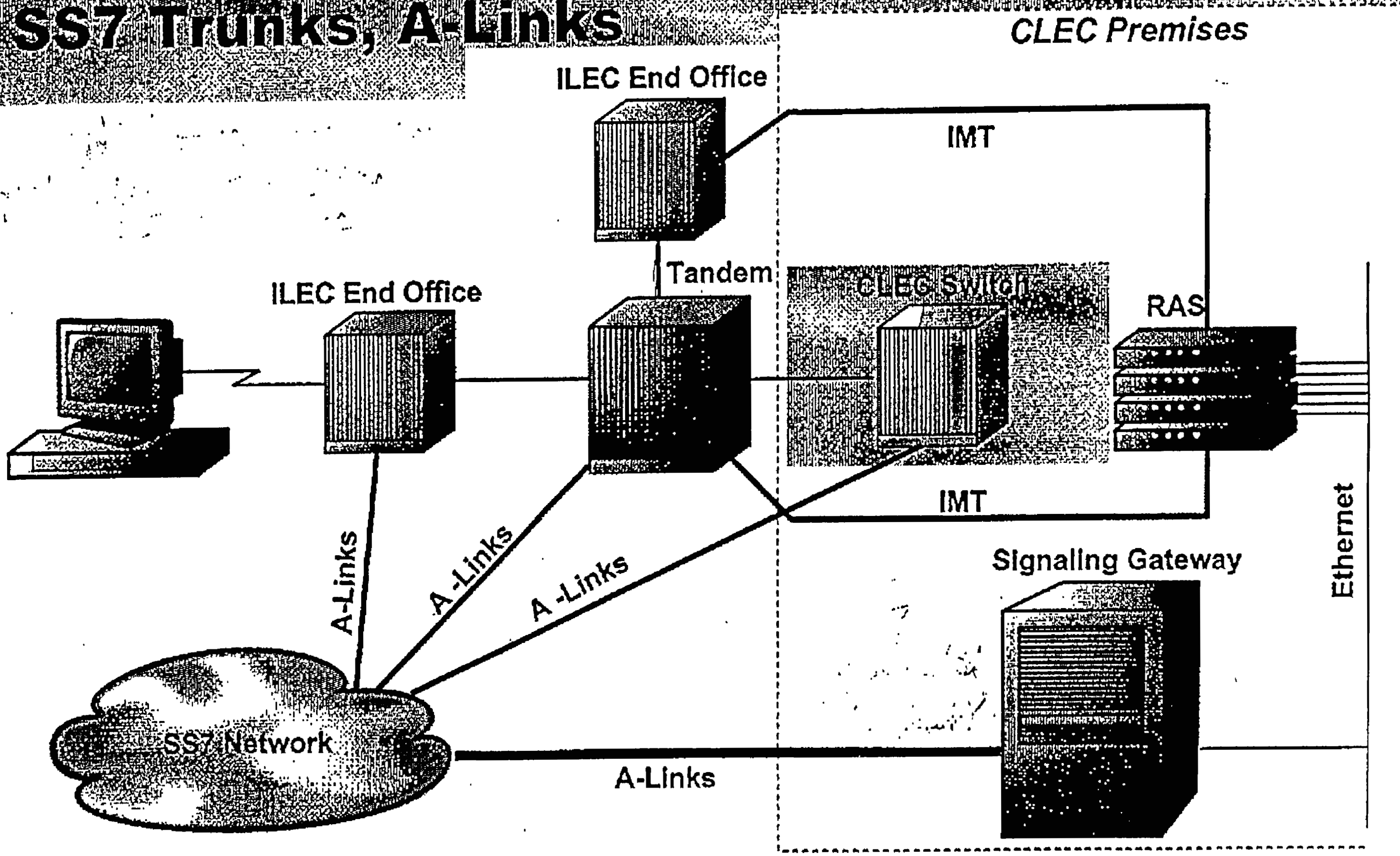
NaviNet Bypass Deployment A: SS7 Trunks, A-Links



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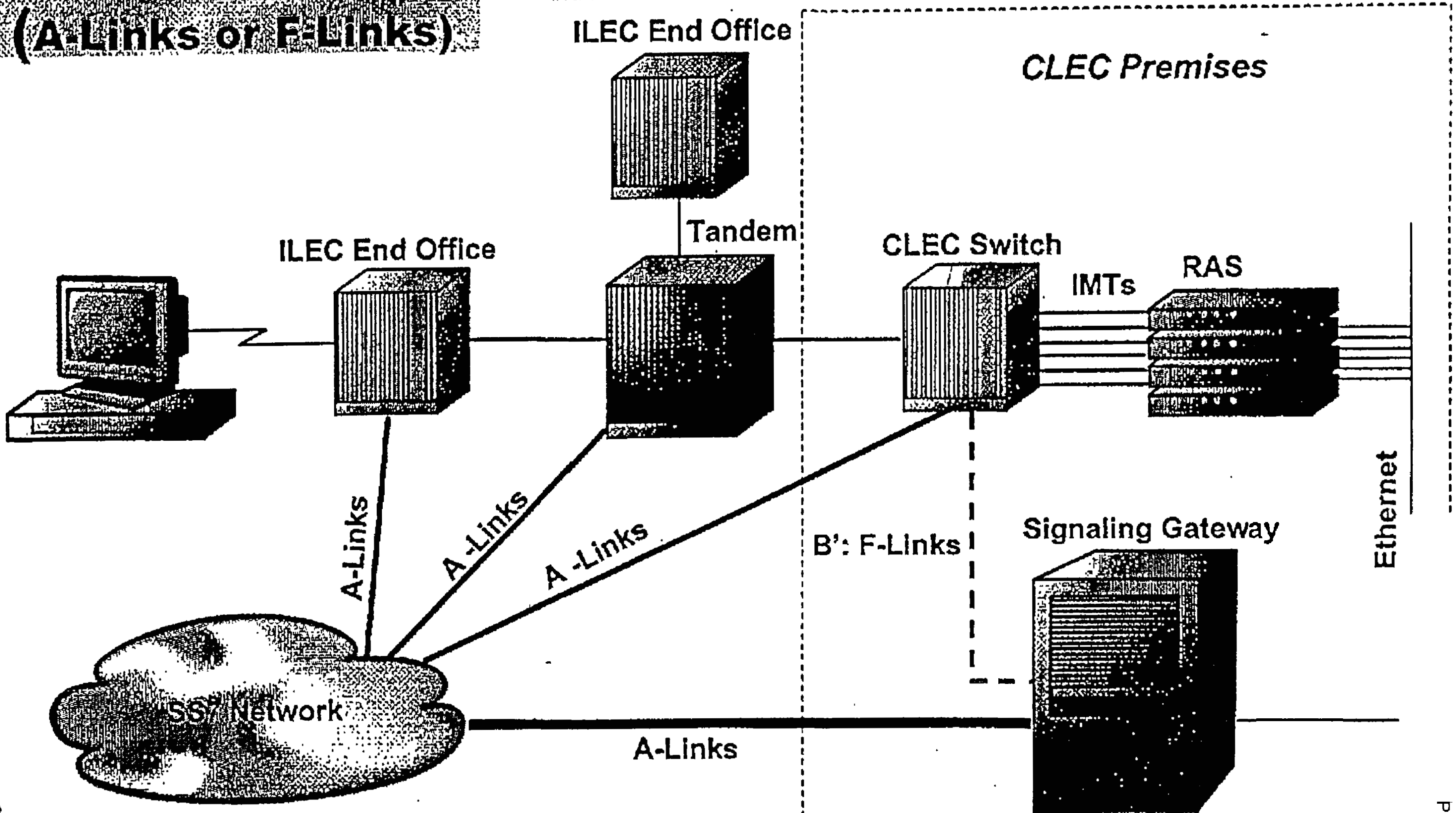
NaviNet

NaviNet Bypass Deployment B and B': SS7 Trunks From Egress Switch (A-Links or F-Links)



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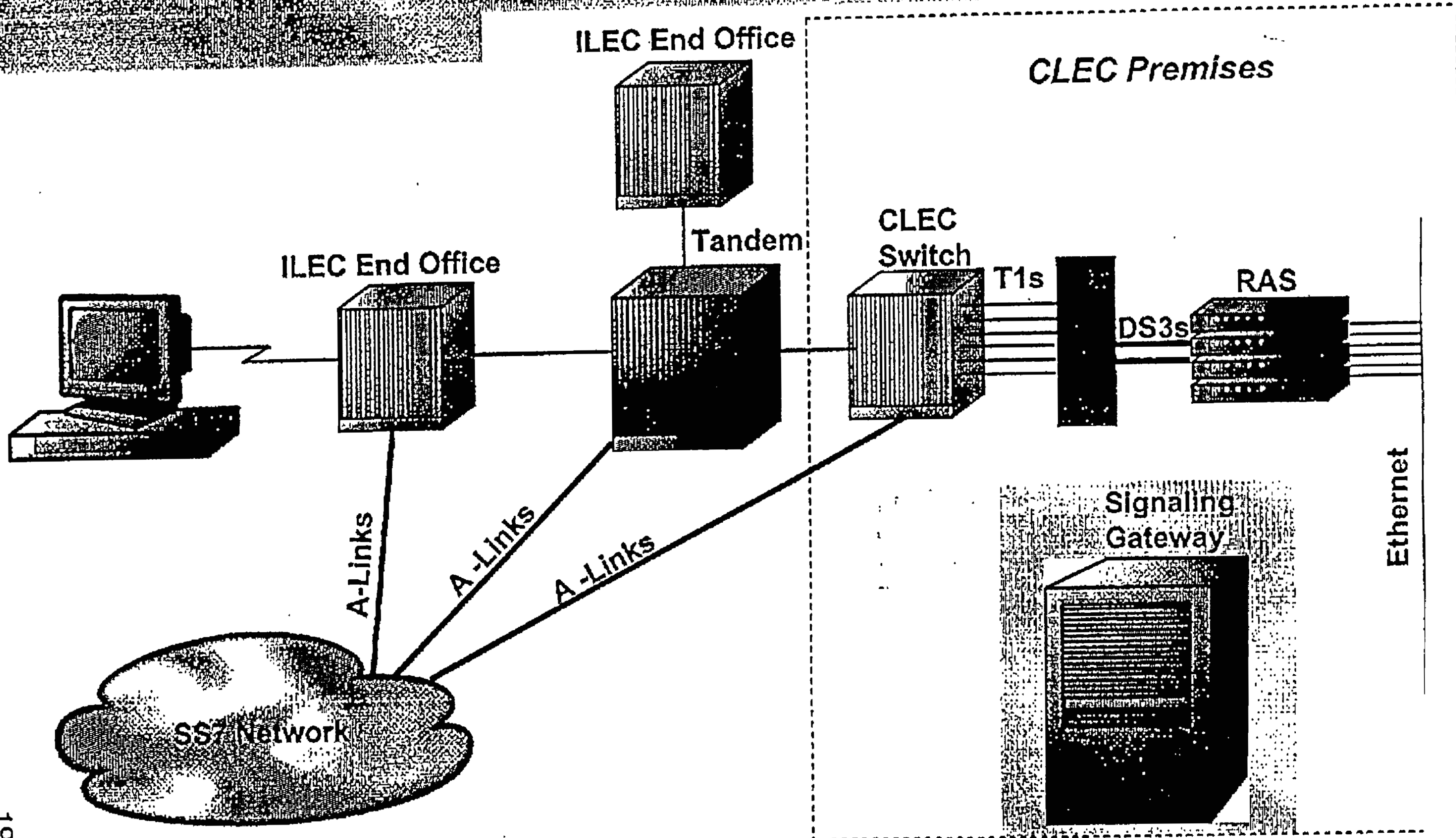
NaviNet Bypass Deployment C
T1s From Egress Switch



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Call Routing: LNP

- IN/AIN methods were non-starters
- We use 1 NPA-NXX for the LRN *Local Routing Number*
- Port a block from each of CLEC's NPA-NXXs *Why? Port Block then report back to CLEC?*
- Port most of LRN NXX back to CLEC
- In some cases, dedicated NXXs

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Capacity Growth

- Getting initial IMTs from each tandem
- Getting *enough* IMTs -- ILEC capacity forecasts
- "Use 'em or lose 'em"
- Adding End Office trunking – DGIS of SS7

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NaviNet

Capacity Management: PRIs vs SS7

- PRIs:
  - CLEC must have IMTs to right tandems
  - NaviNet must trust CLEC to manage capacity of IMTs and of switch
- Bypass -- no shared IMTs
- Set of unique NPA-NXX-XXXXs for each ISP
  - Enables enforcement of capacity control policy...
  - ...which enables meaningful SLAs

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Capacity Management: Downside to Bypass

- More elements to manage
- Instead of one huge hunt group aggregating traffic, less efficient trunk groups are terminated from discrete tandems and end offices

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Cost Considerations

- PRIs:
  - $400 to $1000/mo. = $17 - $43/DS0/mo.
  - If changes in recip comp,
    $2000 = $87/DS0/mo.
- IMTs (typically DS3 over SONET or IXC)
  - $0 - $15,000/mo. = $0 - $22/DS0/mo.
  - Recip comp
  - Downside: initial idle capacity, esp. IXC DS3s
  - CLECs not often economical in carrier choice

↳ CLECs not as good as NNet at getting IXC deals

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