ORIGINAL

e.spire Exhibit ____
Revised Testimony of Tony Mazraani

**BEFORE THE**
**STATE OF FLORIDA**
**PUBLIC SERVICE COMMISSION**

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| Petition by E.SPIRE COMMUNICATIONS, INC., | ) | Docket No. 981745-TP |
| and ACSI LOCAL SWITCHED SERVICES, INC., | ) | |
| AMERICAN COMMUNICATION SERVICES, | ) | |
| OF TAMPA, INC., and AMERICAN COMMUNICATION | ) | |
| SERVICES OF JACKSONVILLE, INC. | ) | |
| for Arbitration of an Interconnection Agreement | ) | |
| with BELLSOUTH TELECOMMUNICATIONS, | ) | |
| INC. Pursuant to Section 252(b) of the | ) | |
| Telecommunications Act of 1996 | ) | |

# REVISED
# DIRECT TESTIMONY
# OF TONY MAZRAANI
# ON BEHALF OF
# E.SPIRE COMMUNICATIONS, INC.

**FEBRUARY 4, 1998***

***Resubmitted on February 19, 1999 with cross-references to the Florida Issues List as it appears in e.spire's February 18, 1999 Issues List Letter.***

**Q. PLEASE STATE YOUR NAME, POSITION, AND BUSINESS ADDRESS.**

A. My name is Tony Mazraani. I am the Director of Data and Internet Product Management of e.spire Communications, Inc. ("e.spire"). My business address is 133 National Business Parkway, Suite 200, Annapolis Junction, Maryland 20701.

**Q. PLEASE REVIEW YOUR BACKGROUND AND QUALIFICATIONS**

A. I earned a Bachelor's degree in Applied Science from Beirut University College, Beirut, Lebanon in 1987. In 1998, I received a Bachelor of Science in Electrical Engineering from Washington University in St. Louis, Missouri. I obtained my Masters in Electrical Engineering at Washington University, in 1990 and conducted graduate research at the Communications Research Center from 1988 to 1990, specializing in: high-speed ATM switch design, VLSI chip design and simulation, discrete-event simulation of LAN performance, and advanced Internet protocol specification. Additionally, I received a patent (US Patent No.: US5633861) for traffic management and congestion control for packet-based networks on May 27, 1997.

**Q. PLEASE DESCRIBE YOUR CURRENT RESPONSIBILITIES AT E.SPIRE.**

A. I joined e.spire in February 1996. In my position as Director, which I have held for fourteen months, I am responsible for, among other things, the full life-cycle management of all e.spire's data products and services, including frame relay service. This involves product specification, pricing, positioning, promotions and profitability. I am also responsible for working with other business units (*i.e.*, engineering, operations, billing, customer care and provisioning) to ensure that these products are developed according to specification. Because e.spire's provision of data services will require interconnection with other carriers, and the resale of other carriers' services, including

incumbent local exchange carriers ("ILECs") such as BellSouth, I am responsible for assisting e.spire's legal department in negotiating interconnection and resale agreements. Prior to becoming Director, I was a regional manager in e.spire's custom network solutions group.

**Q. WHAT POSITIONS DID YOU HOLD PRIOR TO JOINING E.SPIRE?**

A. Prior to joining e.spire, I spent over six years at Sprint International and Alcatel Data Networks. I was involved in the development of multi-service packet switches used for supporting X.25, frame relay and ATM. My responsibilities also included research and development in the areas of traffic management and congestion control for broadband networks based on frame relay and ATM.

**Q. HAVE YOU TESTIFIED PREVIOUSLY BEFORE ANY STATE PUBLIC UTILITY COMMISSION?**

A. Yes. I recently filed testimony with state commissions in Alabama, Colorado, Arizona and New Mexico concerning frame relay service ("FRS") interconnection.

**Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY? [ISSUES 1.D., 12]**

A. The purpose of this direct testimony is to explain:

1. what FRS is;
2. what e.spire believes FRS interconnection with BellSouth should look like; and
3. how the network architecture of a frame relay network is analogous to switched voice traffic networks.

Jim Falvey, e.spire's Vice President of Regulatory Affairs, will explain pricing and reciprocal compensation proposals in his testimony. Dr. Marvin Kahn, of Exeter

Associates, also will discuss the proposed pricing of elements associated with the provision of FRS.

**Q. PLEASE BRIEFLY DESCRIBE E.SPIRE'S FRAME RELAY OPERATIONS. [ISSUES 1.D., 12]**

A. Currently, e.spire has frame relay switches deployed nationwide Using these switches, e.spire provides facilities-based FRS to end user customers, both on a local (intraLATA) and an interLATA basis. e.spire also uses its frame relay network to provide exchange access to interexchange carriers ("IXCs") providing interLATA FRS and seeking access to e.spire's local frame relay network or, through e.spire's frame relay switches, to the networks of other local FRS providers, such as BellSouth. The variety of local and interLATA FRS that e.spire provides are depicted in the schematic attached hereto as Attachment A. In conjunction with providing such access services, e.spire leases long haul transport to frame relay IXCs to supplement their own facilities. In addition to providing FRS on a facilities basis, e.spire also intends to resell to end users the retail FRS of ILECs, such as BellSouth.

**Q. DOES E.SPIRE ACTIVELY MARKET FRAME RELAY SERVICES TO END USERS WITHIN THE SAME LATA? [ISSUES 1.D., 12]**

A. Yes. e.spire currently markets Metropolitan FRS which is available to end users within the same LATA. I have attached marketing information that describes the details of this service offering. (Appended hereto as Attachment B.) Currently, approximately one half of e.spire's frame relay business is intraLATA.

**Q. DOES E.SPIRE PROVIDE METROPOLITAN FRAME RELAY SERVICES ON AN INTRALATA BASIS BETWEEN UNAFFILIATED END USERS? [ISSUES 1.D., 12]**

A. Yes. Such service offerings are invaluable to end users in a variety of situations requiring the ability to engage in electronic commerce, such as between a corporation and its suppliers of key inputs into the business. Many of our end users use their FRS to transact business with unaffiliated persons and other entities (*i.e.*, venders and suppliers).

**Q. HOW DO FRAME RELAY SERVICES FUNCTION? [ISSUES 1.D., 12]**

A. Frame relay services use broadband, high-speed packet-switched technology to communicate digital data between geographically dispersed locations. Networks deploying frame relay technology do not establish circuits between the end users, as do dial-up circuit-switched services, such as traditional voice telephony. Rather, frame relay switches break up a digital information stream into a series of packets of digital data contained in "frames". Each frame is delivered over the network individually. Thus, rather than requiring the allocation of bandwidth to the exclusion of any other end users for the duration of the connection, packet-switched services occupy the network only for as long as it takes to deliver the individual frames, and then only in a "virtual" sense. Even while the FRS service is used the network facility upon which the packets travel can be used simultaneously by many users. Accordingly, frame relay offers lower cost and higher reliability for the transfer of data in contrast to traditional switched services or even leased lines.

**Q. PLEASE DESCRIBE THE FRAMES IN FURTHER DETAIL. [ISSUES 1.D. 12]**

A. The format of a frame consists of a data field of variable length sandwiched between a "flag" and "header" on the front end and a "trailer" and a "flag" on the back end. The flags, headers, and trailers are all in a predefined format. The flags identify the beginning and end of the frame. The header contains routing information to ensure that the network properly delivers each packet to its destination, where the packets – which are transmitted and routed individually – are reassembled into the original communication. The header also contains congestion control information. The trailer holds an error control sequence which supports detection of frames with errors by the destination switch. Should the switch detect a frame with an error, it will discard it. The network will rely on the customer premises equipment (*i.e.*, the recipient's frame relay assembler/disassembler ("FRAD")), to drop the frames once the frames are reassembled. The end application will request retransmission of any discarded packets.

**Q. WHAT ADVANTAGE DOES THIS FEATURE GIVE FRAME RELAY OVER OTHER PACKET-SWITCHED PROTOCOLS? [ISSUES 1.D., 12]**

A. Speed is the advantage. Because other protocols, such as X.25, store each frame until the destination switch acknowledges receipt of that frame, these protocols can be significantly slower than frame relay.

**Q. CAN FRAME RELAY SERVICES SUPPORT VOICE COMMUNICATIONS? [ISSUES 1.D., 12]**

A. Yes. To do so, the voice communication must be packetized. However, to provide acceptable quality, the receiving end must compensate for any variation in delay caused by the packet switching technology. At this time, e.spire has no plans to provide voice

communications using frame relay. However, this may change in the future if frame relay switches evolve in a manner that guarantees quality of service for voice applications.

**Q. HOW DOES AN END USER ACCESS A CARRIER'S FRAME RELAY NETWORK? [ISSUES 1.A., 1.D., 1H, 3, I., 12]**

A. An end user accesses a carrier's frame relay network in a manner similar to the way customers access traditional telephone service, *i.e.*, through a loop to the provider's serving frame relay switch, which BellSouth calls an "access link". The frame relay loop can be over a variety of facilities, including the same type of 2-wire and 4-wire connections involved with regular telephone service as well as digital subscriber line facilities, *i.e.*, xDSL-compatible loops.

**Q. WHAT IS A TYPICAL CONFIGURATION AT A CUSTOMER'S PREMISES TO SUPPORT FRAME RELAY? [ISSUES 1.D., 12]**

A. Typically, a local area network, or LAN, at a customer's location, is linked to a "router", also on the customer's premises. The router simply forwards the information to the network using the frame relay protocol to the loop or "access link", as some carriers call it. If the router itself supports the frame relay protocol, then it sends the frame relay traffic directly to the link, through an appropriate interface, typically a channel service unit/data service unit ("CSU/DSU"). If the router does not support the frame relay protocol, a FRAD is positioned between the router and the CSU/DSU to assemble and disassemble the frame relay traffic.

**Q. WHAT SPEEDS OF DATA TRANSMISSION DOES THE ACCESS LINK SUPPORT? [ISSUES 1.D., 12]**

A. Speeds ranging from 56 Kbps to over 1.5 Mbps.

**Q. HOW DOES A FRAME RELAY SWITCH WORK? [ISSUES 1.D., 12]**

A. The frame relay switch is connected to the access link at a user-to-network interface ("UNI"). When a frame relay customer seeks to communicate with another location on the same network, each of the two locations is given a data link connection identifier, or "DLCI", which is used as address information in much the same way as telephone numbers are used in traditional voice services, although I do not stress that analogy too greatly. The DLCI is used in the header of each frame. Each set of DLCIs creates a permanent virtual circuit, or "PVC", which allows for one-way communications between the two locations. For two-way communications, two PVCs consisting of two pairs of DLCIs must be provisioned. A majority of e.spire's frame relay end users utilize two-way communications services. If a particular frame relay end user has the ability to communicate with ten separate locations over the network, then ten PVCs would be established, each with its own pair of unique DLCIs for one-way communications with these end users. For the ability to utilize two-way communications, which is typical, the end user would require the provisioning of 20 PVCs and 20 pairs of DLCIs. (The same loop, or access link, and UNI could be used for each PVC connecting an end user location to other users on the frame relay network.) When a communication is sent, the frame relay switches read the DLCI of the destination within the header of each packet and route the traffic over the frame relay network to the proper terminating switch which then terminates the communication to the end user.

**Q. ARE THERE ANY FUNDAMENTAL ARCHITECTURAL DIFFERENCES BETWEEN E.SPIRE'S AND BELLSOUTH'S LOCAL FRAME RELAY NETWORKS? [ISSUES 1.D., 12]**

A. No. My understanding is that the frame relay networks of BellSouth and e.spire are largely equivalent in terms of functionality, types of facilities deployed, and architecture.

**Q. WHY DOES E.SPIRE SEEK FRAME RELAY INTERCONNECTION WITH BELLSOUTH? [ISSUES 1.D., 12]**

A. e.spire seeks frame relay interconnection with BellSouth for the same reason that competitive local exchange carriers ("CLECs") seek interconnection for their traditional voice local exchange services, *i.e.*, to allow end users on their facilities-based network to communicate with users on the ILEC's network. Indeed, in many ways, there is very little difference between interconnection in the voice world and interconnection in the frame relay, packet-switched world. Without interconnection, e.spire's facilities-based customers would be limited to communicating with end users on e.spire's packet-switched network. Interconnection will benefit both BellSouth's and e.spire's customers by expanding and enhancing the value of their frame relay links. Any subscriber located on e.spire's frame relay network can request the establishment of PVCs connecting it with any other subscriber. In addition, provided that e.spire is interconnected with BellSouth, any e.spire subscriber may set up a PVC with any BellSouth subscriber.

**Q. WHAT IS REQUIRED TO ESTABLISH SUCH INTERCONNECTION? [ISSUES 1.D., 12]**

A. It really is quite simple. Allow me to illustrate. Suppose an end user is served by BellSouth's frame relay switch "A" and another is served by e.spire's frame relay switch

"B." These two customers, perhaps a company and one of its major suppliers, seek to establish a bi-directional frame relay connection to support electronic commerce between them. What would be needed is a digital transport facility between switches "A" and "B" and network-to-network interfaces (or "NNI" ports) at each switch to complete the link between the networks. The two carriers would establish pairs of DLCIs for each PVC between their two locations, which will traverse the NNI ports and the interconnection facility. Once the DLCIs are in place, the path has been established allowing the exchange of transmissions.

**Q. IS ANY CONSTRUCTION REQUIRED TO SET UP THE PVC? [ISSUES 1.D., 12]**

A. Not usually, unless one end user has no access link or if the interconnection has not yet been established. e.spire believes that access links should be subject to the same ordering/provisioning, performance, and maintenance standards as are or will be made applicable unbundled local loops under e.spire's interconnection agreement with BellSouth. Similarly, the interconnection and transmission facilities themselves should fall under the same ordering/provisioning, performance, and maintenance standards as circuit-switched dedicated transport that is ordered as an unbundled network element. Establishment of DLCIs is simply a software function and can be done quickly and inexpensively. As the Federal Communications Commission observed in its *Section 706 Order*, the ease with which subscribers can establish and terminate different PVCs to different locations on the network or an interconnected network gives packet-switched networks a "degree of 'switched' functionality." *In the Matter of Deployment of Wireline Service Offering Advanced Communications Capability,* FCC 98-188 (Aug. 7, 1998)

n.73. Where access links and an interconnection facility are already in place, e.spire submits that a new PVC should be installed within 24 hours of being requested. Based upon our experience, it only should take about 5 minutes for each carrier to set up the DLCIs for a PVC. Each party should be required to notify the other promptly that the requisite DLCIs have been established and what they are. In the near term, e.spire's needs for prompt notification will be satisfied via e-mail. In the long-term, the Parties should move toward real-time notification via an electronic interface.

**Q. WOULD A SEPARATE INTERCONNECTION BE REQUIRED FOR EACH PVC BETWEEN USERS ON THE TWO NETWORKS? [ISSUES 1.D., 12]**

A. No. The same NNI ports and transport facility can be used to support multiple PVCs between end user locations on the respective networks. As noted before, unique DLCIs will have to be established for each PVC. Like interconnection or interoffice transport in analog voice systems, there are capacity limits. However, whereas all circuits on an analog trunk may be full at a given time, heavily loaded digital trunks will result in a slower transfer of data rather than total saturation and an inability to transmit communications, *i.e.*, blocking. (I note, in passing, that this difference between the voice network and the frame relay network illustrates that in certain ways the frame relay network is even less "dedicated" than the voice network.)

**Q. YOU MENTIONED THAT UNIQUE DLCIs HAVE TO BE ESTABLISHED FOR EACH PVC. WHAT IS INVOLVED IN ESTABLISHING AND MAINTAINING THE DLCIs? [ISSUES 1.D., 12]**

A. Establishment of the DLCIs is a simple, low cost, one-time activity which involves taking a little time for some routine programming of the packet switch. In a frame relay

interconnection scenario involving creation of a PVC between two carriers' switches, it will be necessary for each carrier to notify the other of the DLCI established at its respective switch for the PVC. This, too, is a simple, extremely low cost process, and takes only about 5 minutes to complete. Finally, until the PVC is dismantled, there are essentially no maintenance costs for the DLCI. This obviates any need to set recurring charges for DLCIs.

As Mr. Falvey notes in his testimony, the costs for the port and transport should be prorated jurisdictionally. e.spire believes the Parties should determine up front when the DLCIs are assigned and a PVC is established between the two networks, whether the PVC is intraLATA or interLATA. This will be required to establish the percent local use ("PLU") factor that is an integral part of e·spire's compensation proposal. e.spire is prepared to work with BellSouth to develop appropriate processes in this regard.

**Q. DOES E.SPIRE HAVE A PROPOSAL TO GUIDE WHEN NEW INTERCONNECTION FACILITIES SHOULD BE ADDED? [ISSUES 1.D., 12]**

A. Yes. e.spire proposes an "oversubscription" policy of 200 percent. In other words, when the combined committed information rates, or "CIRs", of the PVCs supported over an interconnection facility total 200 percent of the maximum capacity of the facility, then the Parties must add an additional facility. Thus, for example, if the carriers have a T-1 interconnection with a maximum capacity of 1.5 Mbps, the carriers should add an additional T-1 (and NNI port) when the total CIR of all the PVCs exceeded 3 Mbps. Similarly, a third T-1 (and NNI port) would be added when the total CIR of the PVCs or the two T-1s exceeded 400 percent of the T-1 maximum CIR. When the total costs of the

installed T-1s exceed the cost of a T-3 NNI interconnection, e.spire should have the option of requesting a T-3 interconnection to replace the T-1s, and so forth.

**Q. YOU HAVE MENTIONED TRANSPORT FACILITIES AND NNI PORTS. ARE THERE ANY OTHER PHYSICAL COMPONENTS TO FRAME RELAY INTERCONNECTION? [ISSUES 1.D., 12]**

A. No. The transport facility would simply be direct trunks, the same type of digital interoffice trunks used in the voice world. The NNI ports would be DS1 (or DS3) clear channel ports.

**Q. WOULD THE INTERCONNECTION E.SPIRE REQUESTS BE LIMITED TO TRANSPORT OF LOCAL FRAME RELAY TRAFFIC? [ISSUES 1.D., 12]**

A. No. In addition to the exchange of local, intraLATA traffic, the same frame relay interconnection arrangement could also support the exchange of traffic destined for locations outside the LATA or to support the termination of traffic originating outside the local area on a third-party carrier, such as an IXC frame relay provider. In addition, the interconnection could be used to facilitate indirect transport of the frame relay traffic of another local frame relay provider that has facilities interconnected with e.spire's packet-switched network but not with that of BellSouth. These situations are illustrated in Attachment A of my testimony. As I stated earlier, the interconnection facilities, both transport and NNI ports, are shared facilities that can be used for multiple PVCs by multiple customers. e.spire plans to use these facilities both to support the routing of local frame relay as well as providing exchange access to itself and other interexchange frame relay providers.

**Q. IS E.SPIRE THE FIRST CARRIER TO SEEK FRAME RELAY INTERCONNECTION FROM BELLSOUTH? [ISSUES 1.D., 12]**

A. No. I understand most other carriers have ordered NNI interconnections from BellSouth's tariff.

**Q. IS E·SPIRE'S REQUEST FOR INTERCONNECTION DIFFERENT FROM WHAT THESE CARRIERS HAVE ORDERED? [ISSUES 1.D., 12]**

A. From the perspective of the physical facilities required, no. e.spire would establish the NNI connection through (1) transport between the carriers' frame relay switches in the same LATA and (2) an NNI port at each carrier's switch. But from a pricing perspective, there is a significant difference in what e.spire seeks. Whatever their reasons, the carriers with existing interconnections chose to purchase transport and NNI ports out of BellSouth's tariff. e.spire, in contrast, seeks interconnection under Section 251(c) of the 1996 Federal Telecommunications Act ("Act"). Mr. Falvey has explained e·spire's proposal for the proper allocation of costs under Section 251(c) and the proper level of BellSouth cost recovery under Section 252(d)(2). The tariff was not developed under Section 251 or 252 and, therefore, providing access to NNI ports and transport services through its tariff does not replace BellSouth's obligation to provide FRS interconnection and access to frame relay UNEs in accordance with Sections 251(c)(2) and (c)(3) of the Act.

**Q. BELLSOUTH PROPOSES A DIFFERENT RATE STRUCTURE FOR PRICING OF THE INTEROFFICE TRANSPORT ELEMENT OF FRAME RELAY TRAFFIC BETWEEN E.SPIRE'S FRS END USERS AND BELLSOUTH'S FRS END USERS. PLEASE EXPLAIN THE DIFFERENCE BETWEEN THE**

**FUNCTIONALITY OF THE TRANSPORT ELEMENT PROPOSED BY BELLSOUTH AND THAT PROPOSED BY E.SPIRE? [ISSUES 1.D., 12]**

A. There is no difference between the functionality of the transport element in the e.spire proposal or the BellSouth proposal. As I mentioned earlier in this testimony, after the DLCIs and a PVC are established between e.spire's FRS end user and BellSouth's FRS end user, virtually no maintenance is required to keep the PVC operational, until either party requests disconnection of the PVC. Therefore, e.spire proposes that the costs associated with the establishment of a PVC be incurred at the time it is constructed and that no monthly recurring charges be assessed by either provider of FRS since there are no costs associated with maintaining PVCs.

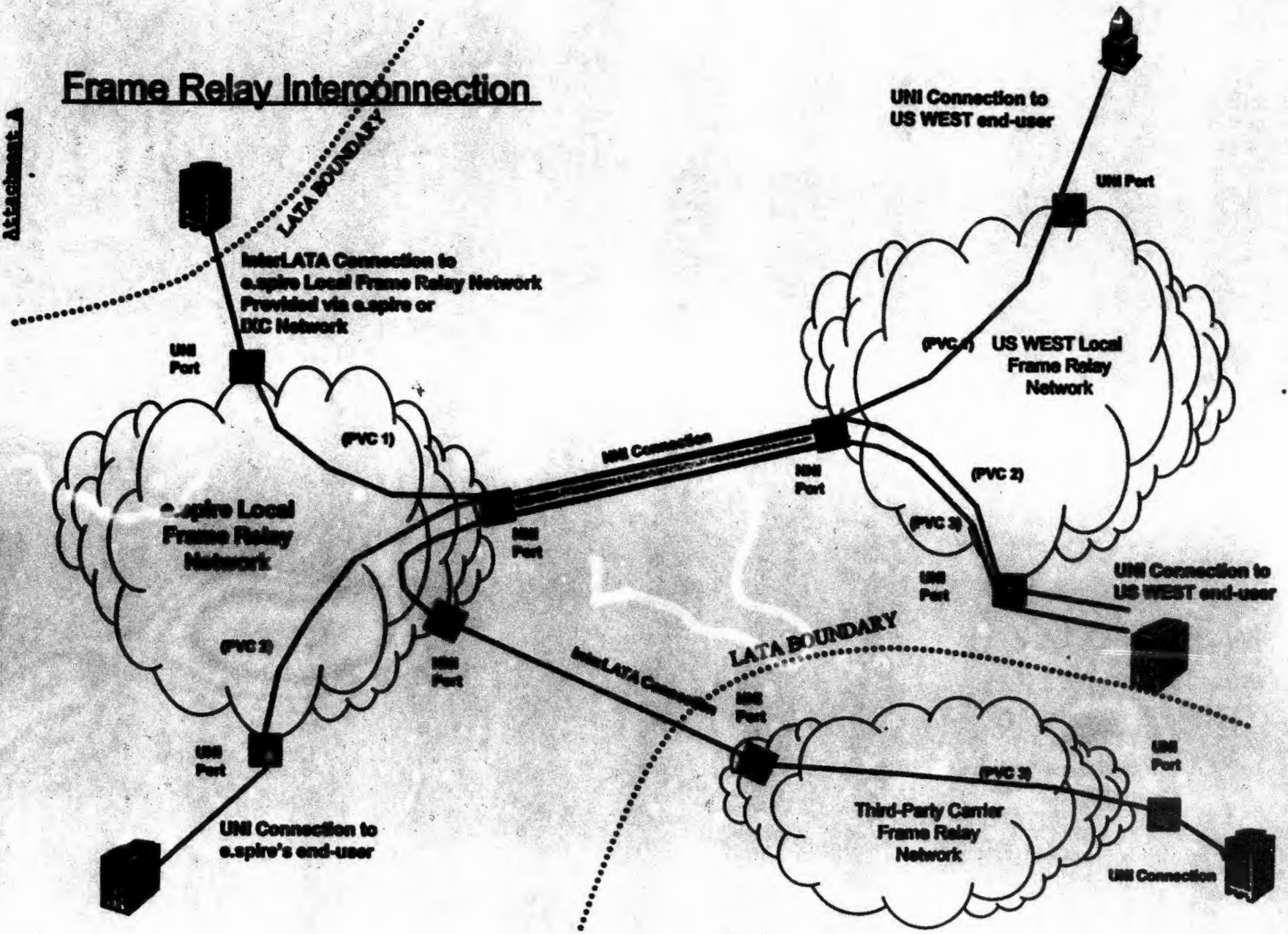
As for the charges associated with transporting packet-switched communications between end users, these are included in the transport charges which are based on the capacity and mileage between the Parties' respective NNI ports. Thus, allowing monthly recurring charges for use of PVCs would allow double recovery of the costs associated with transport of packet-switched communications. Such recovery would be analogous to paying for DS3 transport for circuit-switched voice traffic and being charged an additional fee for usage on a DS0 basis. Since transport is an UNE, prices must be cost-based in accordance with Sections 251(c)(2) and (c)(3) and 252(d) of the Act. Under those sections of the Act, recovery of additional non-cost-based charges for PVCs is impermissible. Mr. Falvey's testimony will address the allocation and recovery of costs proposed by e.spire in more detail.

**Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

**A. Yes. However, I reserve the right to correct and supplement this testimony after reviewing BellSouth's pre-filed testimony, and as a result of any discovery conducted during the course of this arbitration proceeding.**

Attachment A

# Frame Relay Interconnection



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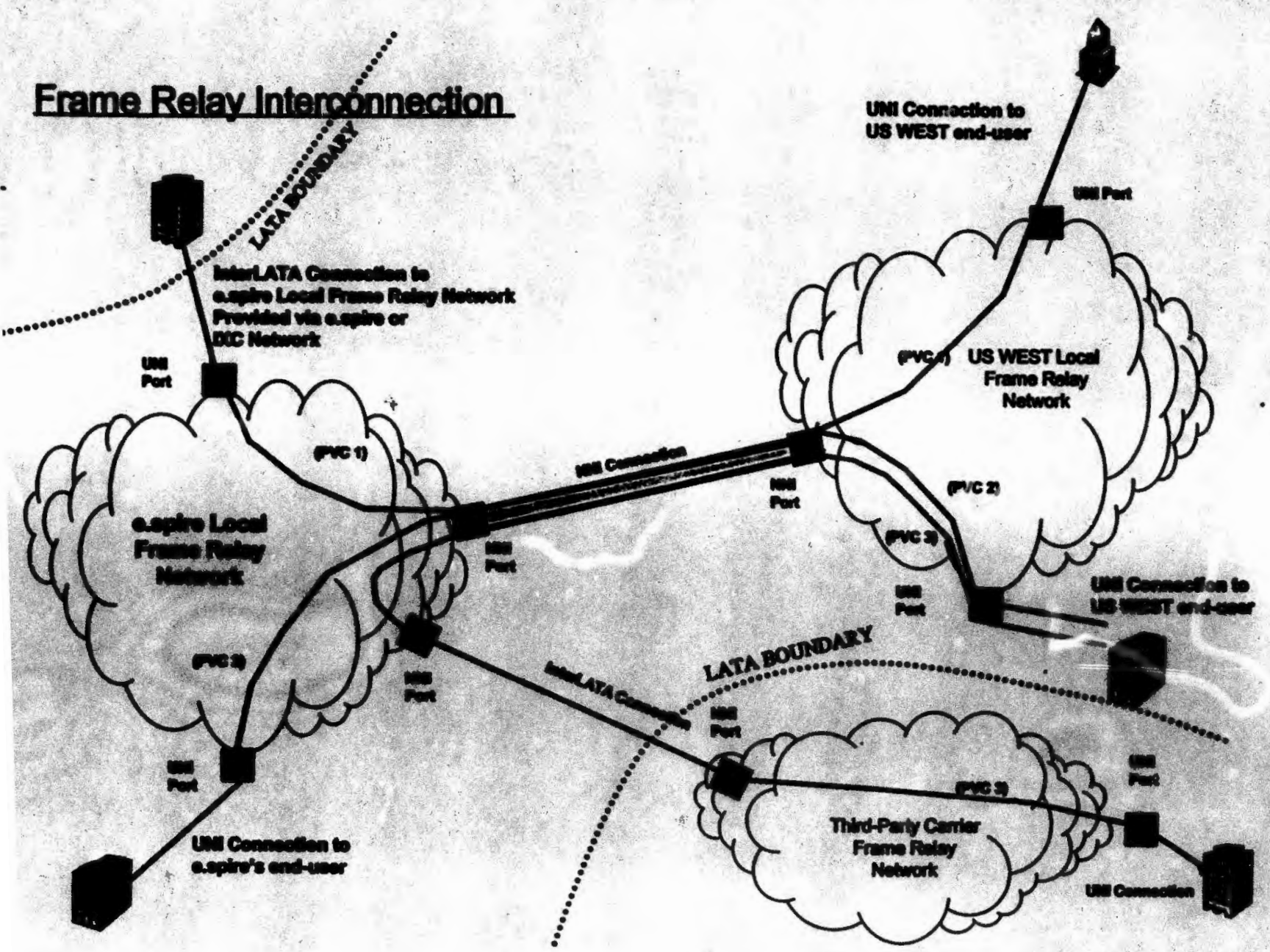
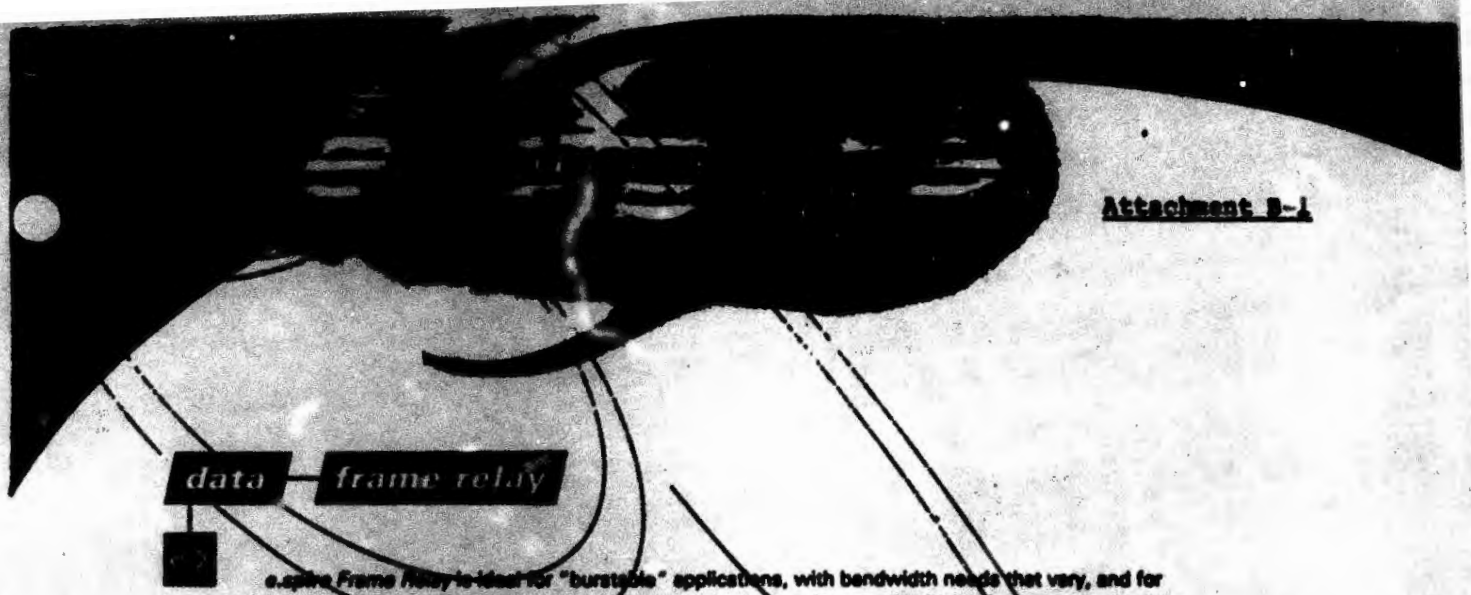




data — frame relay

*e.spire Frame Relay* is ideal for "burstable" applications, with bandwidth needs that vary, and for interconnecting geographically dispersed networks and equipment. Businesses of any size can take advantage of *e.spire Frame Relay* for internetworking, application sharing, e-mail, file transfer, PC-to-PC and PC-to-Server communications, imaging, and multimedia data transmission.

Our internetworking strategy connects *e.spire Frame Relay* to frame relay networks of other key providers via NNIs (Network-to-Network Interfaces). Therefore, *e.spire Frame Relay* offers comprehensive solutions to transparently interconnect your local, regional, and national sites regardless of their location. Our support of multi-protocol encapsulation makes it easier to integrate new and legacy systems.

And since *e.spire Frame Relay* scales to a variety of port connections and Committed Information Rate (CIR), you have the flexibility to implement point-to-point, star, or fully meshed networks with potentially significant savings over private leased-line networks.

### *Service Levels*

Our service is engineered for high-speed data transmission across e.spire's fully redundant ATM network, which is monitored 24 hours a day, 7 days a week, to the point of service demarcation. You benefit from continual service delivery because, in the event of network failure, we automatically reroute traffic.

With *e.spire Frame Relay*, you connect with the speed and service level that is right for your business, and right for your budget. When you subscribe to the level of service you need to meet normal and peak traffic loads, e.spire guarantees bandwidth availability and sustained throughput levels at the Committed Information Rate (CIR). And, when additional network capacity is available, your traffic "bursts" above the CIR, up to the maximum port speed, for even better performance.

### *Connectivity Options*

With our service, you need only one physical connection per site. This connection, or local loop, connects your customer premise equipment (CPE) such as a router, CSU/DSU, or FRAD, to the *e.spire Frame Relay* node. We establish multiple Permanent Virtual Circuits (PVCs) to provide additional logical connections between ports.

for more information, call 133 National Business Parkway fax 301-361-7666
e.spire Communications, Inc. | suite 200 www.espire.net
at 1-888-6espire Annapolis Junction, MD 20701

e·spire

## frame relay

The physical connection, or local loop, connects customer premise equipment (CPE) and the *e.spire Frame Relay* node. Physical connection speeds are:

- 56/64 kbps
- 1.54 Mbps

The port connection represents the maximum port speed on the *e.spire Frame Relay* switch. Port speeds are available at:

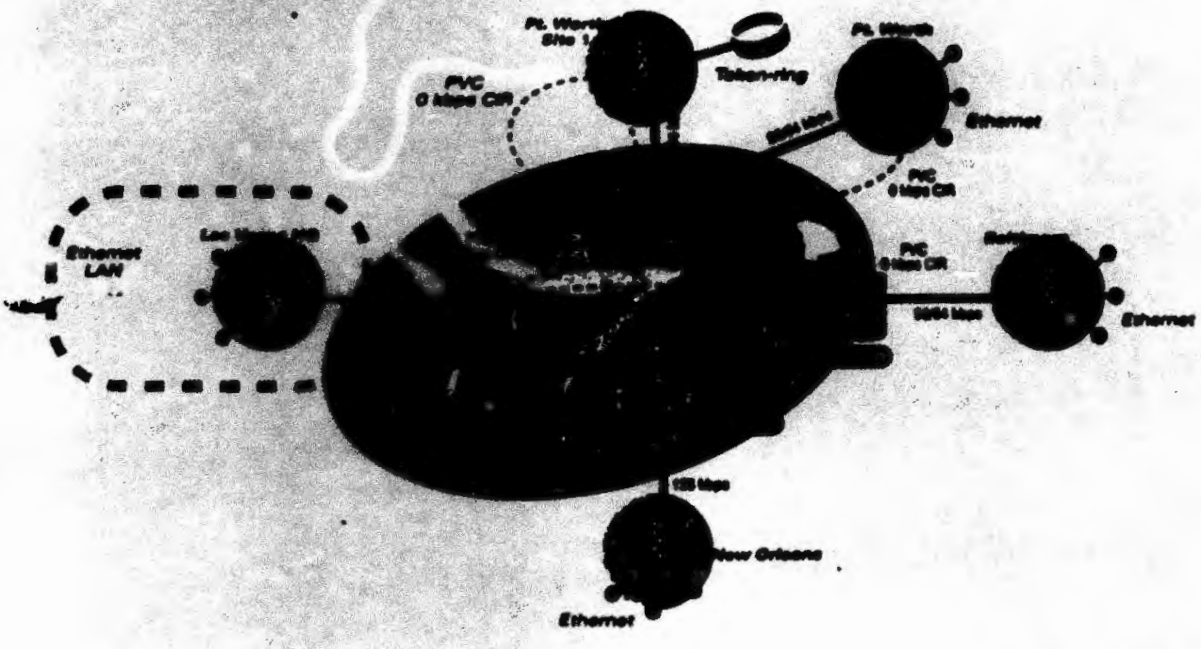
| | | |
|---|---|---|
| 56/64 kbps | 384 kbps | 1024 kbps |
| 128 kbps | 512 kbps | 1.54 Mbps |
| 256 kbps | 768 kbps | |

The CIR is the guaranteed transmission capacity. Committed Information Rate (CIR) increments include:

| | | |
|---|---|---|
| 0 kbps | 128 kbps | 512 kbps |
| 32 kbps | 256 kbps | 768 kbps |
| 56/64 kbps | 384 kbps | 1024 kbps |

This diagram depicts a five-site frame relay network. The headquarters site, in Las Vegas, connects to the *e.spire Frame Relay* service at 1.54 Mbps. It is connected to New Orleans, Ft. Worth Site 1, and Baltimore via Permanent Virtual Circuits (PVCs). While the two Fort Worth sites must communicate with one another, only Fort Worth Site 1 needs to communicate with headquarters. Legacy Ethernet and Token Ring LANs are connected to headquarters utilizing existing customer premise equipment (CPE).

For more information on *e.spire Frame Relay*, or any of our other voice, data or Internet services, contact e.spire at 1-888-6espire.




e·spire

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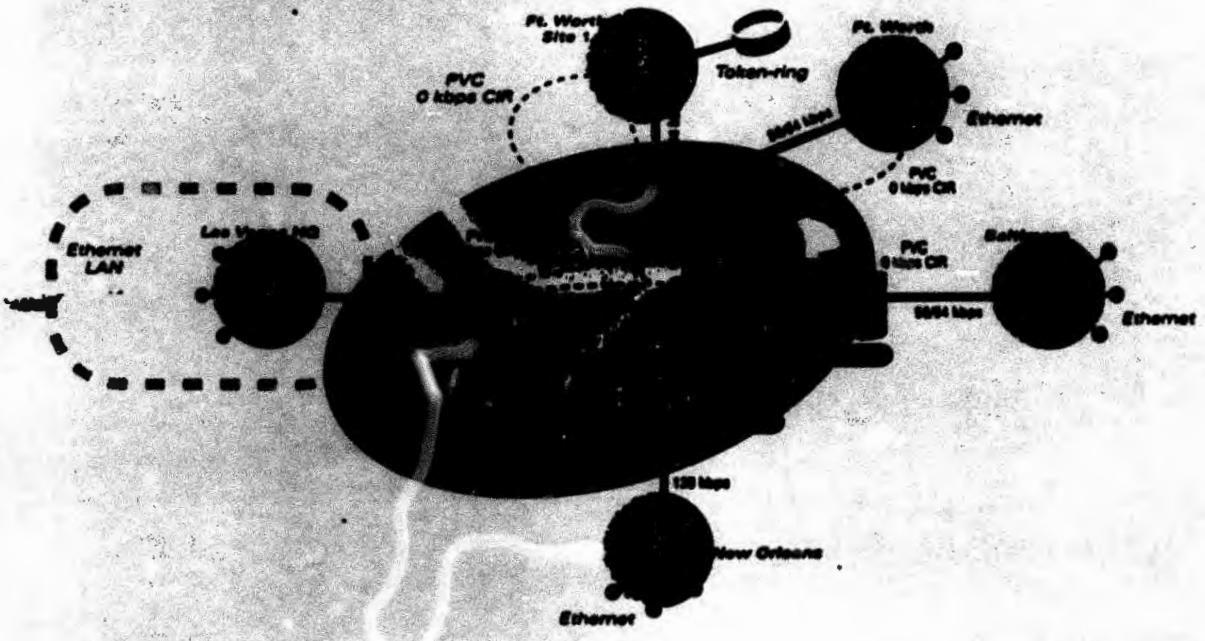


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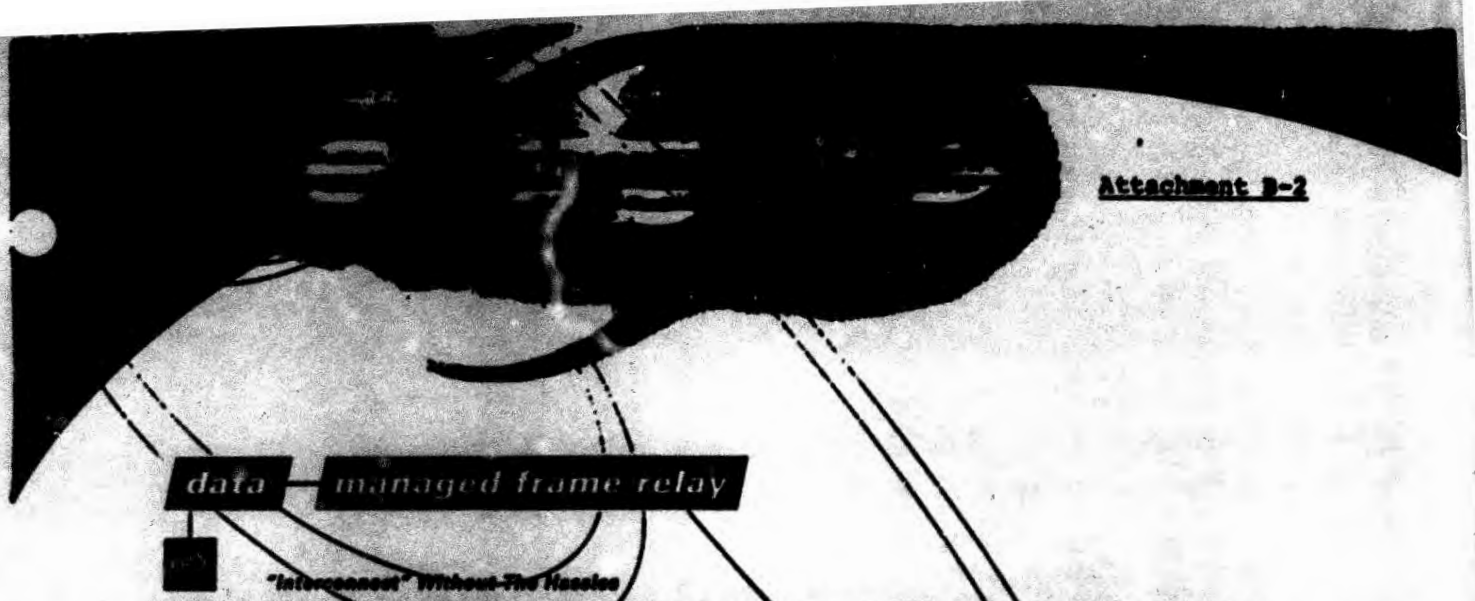


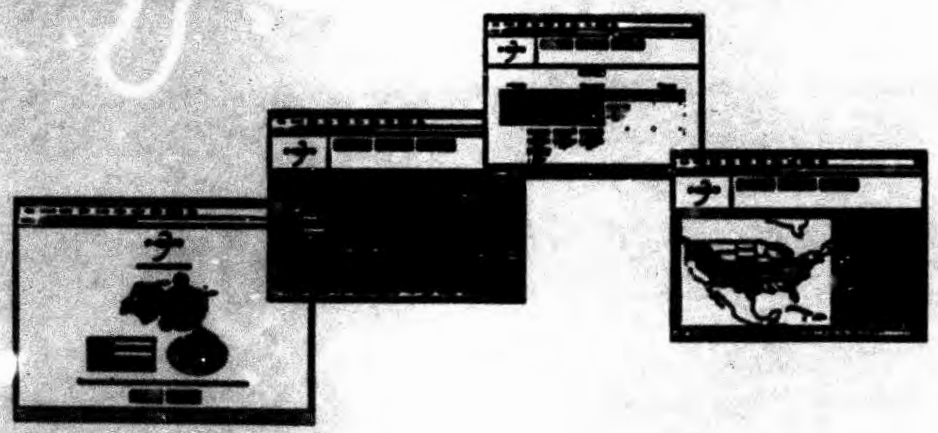
data — managed frame relay

***"Interconnect" Without The Hassles***

***e.spire Managed Frame Relay services make it easy for small to mid-sized businesses to interconnect central and remote facilities, locally, regionally or nationally. These services include network design, provisioning, maintenance and on-going support, so customers can easily share applications, exchange information, transfer files and integrate new and legacy systems.***

**e.spire offers two levels of Managed Frame Relay services. e.spire Frame Relay Select offers a rich set of services for managing multi-site networks. e.spire Frame Relay Premier delivers a complete turnkey solution which includes fully maintained e.spire-supplied CPE. With either approach, customers benefit from the same high-performance networks, service level guarantees, and 24 by 7 proactive monitoring and support. Services may include:**

- **Initial network design and consultation**
- **Complete implementation of telco circuits**
- **Customer Premise Equipment (CPE) and Frame Relay connectivity**
- **On-going maintenance and configuration management of CPE**
- **Management of problem escalation and resolution procedures**
- **On-line access to web-based reports**
- **Periodic network performance and capacity planning reviews**



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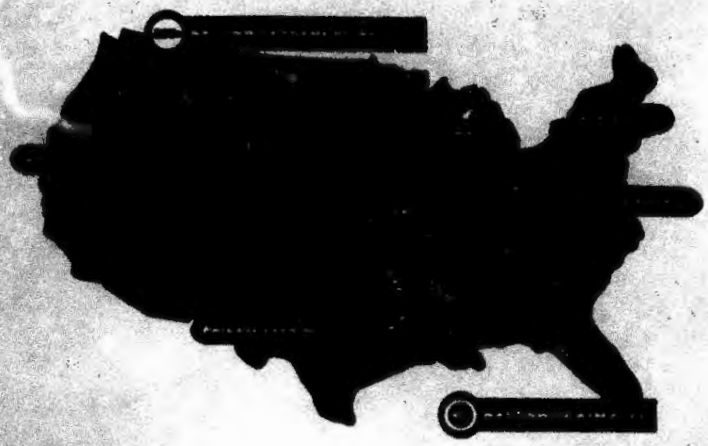

At e.spire, we've engineered an extensive coast-to-coast Frame Relay network, interconnecting over 300 points of presence. The backbone is a fully-redundant, meshed T3 network, designed for maximum throughput, availability and reliability. This allows for flexibility in both proactive capacity management and dynamic rerouting in the event of a failure.

With e.spire Managed Frame Relay, bandwidth availability and sustained throughput are guaranteed. Since the services offer a variety of port speeds with multiple connections to sites within your network, they deliver the flexibility businesses need to implement or integrate point-to-point, star, or fully meshed networks.

Customize e.spire service with Frame Relay Select or take advantage of Frame Relay Premier for a complete "internetworking" solution. Features below highlight offerings for both levels of service.

| Service Features | Service Levels | |
|---|---|---|
| | Select | Premier |
| Speeds ranging from 56Kbps to 1.5Mbps | • | • |
| Connection of Interoperable Token RING networking from 4Mbps to 1.024Mbps | • | • |
| ADSL provided Customer Premise Equipment (CPE) | optional | • |
| Telephone-guided CPE Take-Installation assistance | • | • |
| On-going configuration management of CPE | • | • |
| In-band and out-of-band CPE monitoring | • | • |
| Implementation and tracking of telco circuits, frame relay ports and virtual circuits | • | • |
| 24 x 7 proactive service monitoring, including CPE | • | • |
| Periodic network performance and capacity planning reviews | • | • |
| Trouble ticket and fault isolation procedures initiated and managed to resolution | • | • |
| On-line, web-based reports including implementation status, network availability, network utilization and trouble ticket summaries | • | • |
| CPE maintenance | n/a | • |
| On-site CPE installation | optional | optional |

The e.spire team is firmly committed to supporting our customers' "internetworking" needs as their environments evolve. Additional comprehensive managed services are available for establishing and maintaining global Internet access and secure Internet/Intranet connectivity. e.spire leverages communications technologies and services so customers can focus on their core business competencies.

For more information on *e.spire Managed Frame Relay*, or any of our other voice, data or Internet services, contact e.spire at 1-800-Espire.

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