ORIGINAL

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition of Rhythms Links Inc. for an Expedited Arbitration Award Implementing Line Sharing with GTE Florida Incorporated Pursuant to the Telecommunications Act of 1996	)	Docket No. 000500-TP
In re: Petition of Rhythms Links Inc. for an Expedited Arbitration Award Implementing Line Sharing with BellSouth Telecommunications, Inc. pursuant to the Telecommunications Act of 1996.	)	Docket No. 000501-TP Filed: May 5, 2000

DIRECT TESTIMONY OF JOSEPH P. RIOLO AND JOHN C. DONOVAN

ON BEHALF OF

RHYTHMS LINKS INC.

May 5, 2000

Direct Testimony of Joseph P. Riolo and John C. Donovan

On Behalf of Rhythms Links Inc.

May 5, 2000

I. INTRODUCTION

Q. MR. RIOLO, PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Joseph P. Riolo. I am an independent telecommunications consultant. My business address is 102 Roosevelt Drive, East Norwich, N.Y. 11732.

Q. PLEASE DESCRIBE YOUR EDUCATION AND RELEVANT WORK EXPERIENCE.

A. My education, relevant work experience and qualifications are detailed in my curriculum vita, attached as Exhibit ___ (JPR-1) to this testimony.

Q. MR. DONOVAN, PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is John C. Donovan. I am president of Telecom Visions, Inc., a telecommunications consulting company. My business address is 11 Osborne Road, Garden City, N.Y. 11530.

Q. PLEASE DESCRIBE YOUR EDUCATION AND RELEVANT WORK EXPERIENCE.

A. My education, relevant work experience and qualifications are detailed in my curriculum vita, attached as Exhibit ___ (JCD-1) to this testimony.

II. PURPOSE AND OVERVIEW

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. We have been asked to address some of the technical issues surrounding the use of line sharing to provide xDSL service to end users over a single loop also used for Plain Old Telephone Service ("POTS") in Florida.

Q. PLEASE GIVE AN OVERVIEW OF THE TECHNICAL ISSUES YOU WILL ADDRESS IN YOUR TESTIMONY.

A. Our testimony begins by defining the term line sharing and describes the technical components of the telephone network required for line sharing. We then address the options that competitive local exchange carriers ("CLECs") must have available to provide xDSL for customers on a line-shared loop. Next, we describe those unbundled network elements ("UNEs") that BellSouth Telecommunications, Inc. ("BellSouth") and GTE Florida Incorporated ("GTE") need to provide to CLECs for line sharing and the provisioning intervals for key elements such as splitters and cross-connects. Finally, we discuss the technical, or engineering-related, input assumptions underlying the prices that Rhythms has proposed for line sharing over all-copper loops..

III. TECHNICAL DEFINITION OF LINE SHARING

Q. PLEASE DEFINE THE TERM "LINE SHARING."

A. As used in this proceeding, "line sharing" is the use of a single loop to provide both POTS and certain high-bandwidth xDSL digital transmission capabilities between a customer's premises and the central office. Such sharing is possible because voice traffic occupies a narrow bandwidth in the lower end of the spectrum available on a loop, traditionally accepted in the industry as between 300 and 3400 Hz. For those types of xDSL services that permit line sharing, xDSL traffic occupies the high end of the spectrum available on a loop, (*i.e.*, above 4000 Hz). Therefore, both low bandwidth POTS and higher bandwidth xDSL can coexist on a single physical loop.

Customers can obtain significant benefits from line sharing arrangements, because all voice and data needs can be met using a single loop to a home or business location. Thus, line sharing reduces the cost and time required to install or activate additional services into homes and businesses. Second, consumers will get a significant price break, if the incumbent carriers properly cost and price those network elements that CLECs need for line sharing. This is true because customers will no longer pay for one physical loop to meet their voice needs, and another separate physical loop to meet their data transmission needs. They need only pay for one single loop to meet both needs. Third, line sharing conserves limited local loop resources. Customers will not require a second loop to provide full-time data service. In addition, CLEC orders will not have to be turned back due to lack of facilities, since an existing POTS circuit can be used for xDSL in addition to basic service. Fourth, assuming that the line sharing network elements are properly priced, CLECs will have access to the same competitive advantages as ILECs by offering to provide xDSL service over an existing ILEC POTS line.

Q. PLEASE DEFINE THE TERM "xDSL."

A. "DSL" is an acronym for Digital Subscriber Line. "x" is a variable, meant to encompass the various types of Digital Subscriber Line technologies, and is used when referring generally to DSL. Digital Subscriber Line technologies are transmission technologies used on circuits that run between a customer's premises and the central office. Traditionally, DSL technologies have been deployed on loops that are copper end-to-end ("Home Run Copper"). However, with the deployment of new network equipment by incumbent local exchange carriers ("ILECs"), some types of DSL may be deployed on hybrid loops that are copper from the customer's premises to a mid-point equipment location known as a remote terminal ("RT"), and then via fiber optics from the RT to the central office.

This Phase 1 testimony addresses DSL services provided via line sharing on Home Run Copper loops. We intend to file additional testimony in Phase 2 of this proceeding to address DSL services provided via line sharing on loops that traverse fiber optics from the RT to the central office.

Q. PLEASE DESCRIBE GENERALLY THE DIFFERENT TYPES OF xDSL TECHNOLOGIES AVAILABLE.

A. There are a variety of DSL technologies available for use by carriers today. Some of the major categories have subsets characterized by different line coding approaches or amounts of bandwidth. The major categories are Asymmetric Digital Subscriber Line, or ADSL; Rate Adaptive Digital Subscriber Line, or RADSL (a type of ADSL); Symmetric Digital Subscriber Line, or SDSL; High-bit-rate Digital Subscriber Line, or HDSL; Very high speed Digital Subscriber Line, or VDSL; ISDN Digital Subscriber Line, or IDSL; and G.Lite.

Q. **WHAT TYPES OF xDSL CAN BE PROVIDED IN A LINE SHARING ARRANGEMENT?**

A. Because POTS normally occupies the frequencies between 300 and 3400 Hz, ADSL can be used on the same loop as POTS because both the downstream and upstream data signals, which are transmitted on different frequencies, fall within a range above those frequencies used to transmit voice signals. ADSL was originally developed to support the delivery of entertainment video, or "video dial tone," services over existing copper loops. Such video services require much higher bandwidth in the "downstream" direction (towards the customer premises) than they do in the "upstream" direction (towards the central office), because the video signals being transmitted to the customer's premises require a large amount bandwidth, and the upstream signal is assumed to be a non-video data signal requiring much less bandwidth. Thus, the need for bandwidth was deemed to be asymmetrical; that is, a high bandwidth signal exists in the downstream direction and a lower bandwidth signal exists in the upstream direction. ADSL is also useful for Internet access, because such traffic tends to display an asymmetrical pattern similar to video dial tone services. Most Internet traffic flows toward the end user, as graphics-intensive web pages and data files are downloaded. The upstream traffic normally consists of a few keystrokes and occasional uploads of email and data files.

RADSL, a type of ADSL, can also be used in a line sharing arrangement. Just like ADSL, the downstream and upstream data signals are transmitted using separate frequencies, and both data streams use frequencies above the frequencies used to transmit voice signals. Therefore, RADSL can be used on the same loop as

POTS service in a line sharing arrangement. As is the case with other types of ADSL, the downstream and upstream data transmission rates are asymmetrical (as an alternative, it is also possible to configure RADSL for symmetrical data transmission rates). RADSL is more flexible than other types of ADSL because it is rate adaptive; that is, the DSL equipment automatically and dynamically adjusts the transmission speed of the circuit to the optimal level achievable on each loop. RADSL can therefore transmit data at a wide range of transmission speeds, depending on the length and condition of the loop in question. G.Lite is a throughput limited version of ADSL, used on loops with simple filters, rather than splitters, at the subscriber end. G.Lite was developed to eliminate the requirement for a splitter installation at the customer premise. It uses the same part of the frequency spectrum as ADSL, and thus can be used in a line sharing arrangement. Additional enhancements and modifications to xDSL will surely continue in this technology aggressive industry.

Q. WHAT TYPES OF xDSL CANNOT CURRENTLY BE USED IN LINE SHARING ARRANGEMENTS?

A. SDSL, HDSL, VDSL and IDSL are all symmetrical configurations of xDSL. The downstream and upstream data signals are transmitted using a full range of frequencies, including those used to transmit voice signals. As a result, SDSL, HDSL, VDSL and IDSL equipped loops cannot currently line share with analog POTS service.

Q. IS IT POSSIBLE THAT OTHER TYPES OF xDSL OR OTHER ADVANCED SERVICES WILL BE ABLE TO LINE SHARE IN THE FUTURE?

A. Yes. Therefore, it is important to understand that this list only represents current types of xDSL that can be deployed in line sharing arrangements today. There is great interest in various types of advanced services such as xDSL among carriers, vendors, and end users because of the promise of higher bandwidths and lower costs for applications such as Internet access and corporate LAN access. To respond to this demand, vendors are working hard to optimize and extend existing DSL technologies, and are developing new DSL and other advanced service technologies. The advanced services world is not static, and this Commission should ensure that CLECs will be able to deploy emerging xDSL technologies and other advanced service technologies on shared loops with analog POTS. Because xDSL technology is changing rapidly, this Commission should ensure that ILECs cannot artificially restrict the future deployment of xDSL, in line sharing or in any other network configuration.

Q. HOW SHOULD THE COMMISSION DETERMINE WHICH xDSL TECHNOLOGIES ARE SUITABLE FOR LINE SHARING ARRANGEMENTS?

A. CLECs should be allowed to deploy any xDSL or other advanced services technology that comply with industry standards, or are approved by an industry standards body, the Federal Communications Commission ("FCC") or any state commission. Additionally, such technology should be eligible for deployment if it has been (at the time the CLEC is seeking deployment) successfully deployed by any carrier in any state. In order to ensure that ILECs cannot arbitrarily or artificially prevent or restrict a CLEC's ability to deploy new advanced services, an ILEC should have to assume the burden of proof for demonstrating the basis of any concerns that a particular technology will cause unacceptable degradation of other services. Specifically, the ILEC should be required to prove to the Florida Public Service Commission, and obtain an order or other decision concluding, that the deployment of a particular technology will so significantly degrade the performance of other advanced services or traditional voice band services that restrictions should apply.

IV. <u>NETWORK COMPONENTS REQUIRED FOR LINE SHARING</u>

Q. WHAT NETWORK ELEMENTS MUST A CLEC HAVE IN ORDER TO PROVIDE xDSL IN A LINE SHARING ARRANGEMENT?

A. Obviously, a CLEC must have in place all of the equipment and network elements to provide xDSL service. In addition, the CLEC will need services, network elements and interconnection components from the ILEC required to place the xDSL signals on the high bandwidth portion of a POTS loop.

Q. WHAT COMPONENTS ARE NEEDED FOR THE PROVISION OF xDSL?

A. CLECs must have access to a "clean copper" loop, or at least the copper portion of a loop, that is free of impediments such as load coils, excessive bridged tap, repeaters, Digital Added Main Line ("DAML"), noise, or any other condition that has a deleterious effect on xDSL service. Impairments such as load coils and the use of bridged taps longer than 2500 feet have been obsolete for the past 20 to 30 years.

Repeaters and other old local loop devices either render local loops unusable for even POTS service, or are so obsolete that they should have been removed by ILECs when their use was no longer necessary. DAMLs are placed as a temporary expedient on loops to mitigate a lack of outside plant facilities, and should be removed by ILECs when they are no longer required via the provision of adequate facilities inventories. Impairing devices and technologies should not exist on a loop, and they preclude or degrade xDSL signals. However, since such devices or conditions may exist in the legacy-embedded plant, especially on an older outside plant that has exceeded its useful service life or has been rearranged for other uses, the ILEC should remove interferors to bring loops up to ISDN/xDSL transmission standards.

Q. SHOULD LOAD COILS EXIST ON COPPER LOOPS THAT ARE LESS THAN 18,000 FEET IN LENGTH?

A. No. Load coils on POTS loops were appropriate, under old design guidelines, when loop lengths exceeded 18,000 feet to mitigate the build up of capacitance over long distances. However, according to engineering design rules that have been in place for 20 years or more, long loops, such as those over 18,000 feet, should be fed via Digital Loop Carrier systems, so that Load Coils are never required. Any working POTS loop of less than 18,000 feet should have load coils removed to provide for good quality service. The presence of these devices on loops less than 18,000 feet are detrimental to both POTS and advanced services.

Q. HOW ARE LOAD COILS DETRIMENTAL TO LOOPS OF LESS THAN 18,000 FEET?

A. Besides increasing additional resistance by 8.5 Ohms per load coil, load coils significantly deteriorate the performance of analog modems on POTS loops to as low as 21.6 kbps for a 56 kbps modem. Poor analog modem performance was the primary reason the FCC determined that any forward looking model used to determine loop costs for the purposes of its Universal Service Fund proceedings should be based on loops free of load coils (see FCC May 7, 1997 Report and Order CC Docket No. 95-45 §250). The result was to increase the deployment of Digital Loop Carrier to avoid any analog copper loop being longer than 18,000 feet. The FCC did not address the preclusion of load coils on loops of less than 18,000 feet, because they recognize that load coils do not belong on such loops.

Adding unnecessary resistance to the loop reduces the sound volume on the circuit. More importantly, analog modems designed for 56 kbps service use complex combinations of audio tones that require the full use of voice spectrum up to 3400 Hz. Load coils block higher frequencies, thereby causing 56 kbps analog modems to self adjust themselves to much lower speeds, such as 21.6 kbps, based on the load coil reduced frequency spectrum available.

Q. WHAT ELSE MUST THE ILECS MAKE AVAILABLE FOR CLECS TO PROVIDE xDSL SERVICE?

A. ILECs must also make available the technical characteristics of the loop. While we will provide further testimony on the need for this information in Phase 2 of this proceeding, it is important to note that CLECs must be able to access loop makeup information contained in the databases of the incumbent LECs.

Q. PLEASE EXPLAIN THE GENERAL LINE SHARING TRANSMISSION PATH.

A. As explained in Exhibits ___ (JPR/JCD-1) to ___ (JPR/JCD-4), attached to this testimony, there are two different network configurations for line sharing. It is important to note that BellSouth, GTE and other ILECs have acknowledged that they intend to provide line sharing over both of these configurations.

The first, which we call "Home Run Copper," consists of voice and data carried simultaneously on an all copper loop from a customer's premises to the Main Distribution Frame ("MDF") in the ILEC's serving wire center. As Exhibits ___ (JPR/JCD-1) to ___ (JPR/JCD-3) show, a copper distribution pair runs from the customer premises to the field side of the ILEC's serving area interface ("SAI"), where it is connected to a copper feeder pair on the central office side of the SAI. This copper feeder pair terminates in an appearance on the loop side of the Main Distribution Frame ("MDF"), located in the ILEC's serving wire center. From the MDF, that loop is then connected via a cross-connects to a splitter, where the low bandwidth (for POTS) and the high bandwidth (for data) are separated.

As we explain below, a home-run copper arrangement can be line shared: via a cross-connect connected to the CLEC collocation arrangement, where it connects with splitter/Digital Subscriber Line Access Multiplexer ("DSLAM") equipment that the CLEC owns, via a cross-connect to a common splitter location available to all CLECs, or via a splitter at the distribution frame (or another incumbent-controlled area in the central office). The POTS signal is then sent via a cross-connect from the splitter to a POTS switch. The data signal is sent via a cross-connect from the splitter to the CLEC DSLAM collocated in the ILEC serving wire center. In addition, jumpers are needed at each point of cross connection, including at the MDF and the splitter.

The second configuration, which we call "Fiber Fed DLC," consists of voice and data carried simultaneously on a copper loop from a customer's premises to a Remote Terminal, and then carried on fiber from the Remote Terminal to the central office, and on to a CLEC's designated point of interconnection. Exhibit ___ (JPR/JCD-4) illustrates this second network configuration, which we intend to address in our Phase 2 testimony.

Q. WHAT NETWORK COMPONENTS AND EQUIPMENT ARE REQUIRED FOR THE "HOME RUN COPPER" CONFIGURATION?

A. CLECs need access to the high bandwidth portion of an all-copper loop that runs from the demarcation point at the customer premises to the ILEC's serving wire center. At the serving wire center, the CLEC must be able to access a splitter to separate the data signal from the voice signal and route the data signal to its collocated DSLAM.

CLECs should be given the option of having the splitter placed in one of three possible locations: (1) at the MDF or in other ILEC space, (2) in the CLEC's collocation arrangement, or (3) in a common area accessible to all CLECs that are collocated in that wire center.

Q. MUST CLECS HAVE PHYSICAL ACCESS TO THE SPLITTER, IRRESPECTIVE OF THE LOCATION ARRANGEMENT?

A. Yes. The quality assurance given by the CLECs to their customer base relative to xDSL services requires that CLECs have physical access to the splitter regardless of its location. Moreover, this access must be of a nature that is available 24 hours per day, 7 days per week, and not requiring an ILEC employee escort. This access is primarily required to perform trouble isolation work; for example, to determine whether a problem is in the ILEC's portion of the circuit, the CLEC's portion of the circuit, or even to discover whether a splitter card has been inadvertently removed, thereby putting the entire circuit out of service.

Q. WHICH OF THESE COMPONENTS ARE PROVIDED BY THE ILEC AND WHICH ARE PROVIDED BY THE CLEC?

A. ILECs must provide the high bandwidth portion of the loop as an unbundled network element ("UNE"). ILECs provide cross connect under their existing collocation arrangements and prices. The ILEC must also provide jumpers between tie pair appearances in non-collocation space. CLECs should have the option of self-provisioning the splitter, purchasing the splitter and providing it to the ILEC for installation and maintenance, or using an ILEC-purchased, owned and maintained splitter.

Q. HOW QUICKLY SHOULD ILECS PROVIDE TIE CABLING REQUIRED FOR LINE SHARING?

A. As we understand it, under the FCC's Line Sharing Order, ILECs must begin providing line sharing arrangements to CLECs by June 6, 2000. (Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Third Report and Order, CC Docket No. 98-147, Fourth Report and Order, CC Docket No. 96-98 ("*Line Sharing Order*")). Therefore, ILECs should already be developing the UNEs necessary for line sharing. ILECs should allow CLECs to begin ordering the line sharing UNEs immediately, even if they are not available for operation until June 6, 2000.

As we understand the FCC's requirements, ILECs are not to be permitted to delay the availability of line sharing beyond that deadline while they develop automated ordering and provisioning systems. Rather, it is our understanding that the FCC expects ILECs to implement temporary arrangements and workarounds over the near term, while working with CLECs on an ongoing basis to design automated systems that provide for nondiscriminatory access to fully automated operations support systems ("OSS") for all functions: pre-ordering, ordering, provisioning, billing, repair and maintenance. Rhythms has recommended that OSS issues be considered in Phase 2 of this proceeding, and will introduce further testimony on OSS issues at an appropriate later date.

ILECs should also begin immediately to install cross connect for use by CLECs in line sharing arrangements. ILECs should complete the installation and provisioning of any cross-connect ordered by CLECs within thirty calendar days of receipt of a request from a CLEC. This expedited timeframe should apply regardless of whether a CLEC has its equipment collocated in a cage or elsewhere in an ILEC's serving wire center.

Q. ARE THERE ANY TECHNICAL REASONS WHY ILECS CANNOT PROVISION CROSS-CONNECT IN THIRTY DAYS FOR LINE SHARING ARRANGEMENTS?

A. No. Some ILECs may claim that they cannot meet the thirty day installation interval, but there is strong reason to believe that they can. Although complex installations in wire centers may be routinely scheduled to take more than thirty days, such installations cover a wide range of equipment of varying complexities, configurations, and testing requirements. For example, installation of complex power equipment in a wire center will take much longer than installation of a cross-connect. Thus, ILECs often commit to installation intervals lengthy enough to cover any type of installation, no matter how complex.

Installation of cross-connects however, is a simple task that ILECs routinely perform. Because the FCC's order in late 1999 required that line sharing be available by a date certain, ILECs should have been, and should be planning to proactively install numbers of cross-connects, and as discussed below, splitters, necessary for line sharing on an expedited basis and in bulk. Installation of multiple cross-connects can be done efficiently and quickly at any particular serving wire center, making the thirty day installation interval quite achievable.

Based on our experience with ILEC installations in other states, it is clear that ILECs can accomplish installations of simple cross-connects within thirty days. For instance, in Texas, Southwestern Bell Telephone Company ("SWBT") agreed to provide Rhythms and Covad with installation of entire collocation arrangements in thirty days. Entire collocation arrangements are far more complex than cross-connects and line sharing equipment installations. Building an entire collocation arrangement, even cageless, requires space preparation, cabling and installation of racks. Such installation requires much more planning and installation activities than a simple cross-connects. Therefore, we have no doubt that ILECs can install all ties cables required for CLEC line sharing arrangements within thirty days of a CLEC request.

Q. WHY DO CLECS WANT THE OPTION OF PURCHASING AND OWNING THE SPLITTER?

A. CLECs need unobstructed access to the splitter. The best way to ensure such access is to own the equipment. Access is vital because CLECs guarantee service quality and reliability levels for advanced services such as xDSL. It would be very difficult for CLECs to live up to those guarantees if they were not able to own, control and maintain equipment. This problem would be especially acute if ILECs were allowed to own the splitter, but not required to purchase the splitter from the CLEC's vendor of choice. Equipment from different vendors has differing levels of quality, features, and reliability.

There are other reasons why CLECs may want to own the splitter. In the short term, CLECs can help ensure that splitters needed to support line sharing arrangements are deployed as rapidly as possible. If ILECs exclusively control the purchase and ownership of splitters, but are not able to obtain and/or deploy all of them within deadlines set by the FCC, there will be nothing CLECs can do.

CLECs will be prevented from exercising their right to access line sharing arrangements in a timely manner, but will be unable to take action by purchasing their own splitters and deploying them in their collocation arrangements.

In the long term, allowing CLECs to own splitters will ensure that new leading edge technologies are deployed as rapidly as possible to serve customers with new capabilities. ILECs are less likely to stay at the leading edge of technology deployment because they invest in very large volumes of equipment from one vendor.

Q. WHAT ARE THE POSSIBLE LOCATIONS FOR SPLITTER PLACEMENT IN A SERVING WIRE CENTER?

A. There are three possible locations for the splitter. The first option allows a CLEC to purchase and own the splitter, and to locate the splitter in the CLEC's collocation arrangement (depicted in Exhibit ___ (JPR/JCD-1)). In this scenario, both the POTS and data traffic will arrive at the CLEC collocation arrangement via a cross-connect obtained from the ILEC. At the collocation arrangement, the cross-connect will terminate at the splitter, which will separate the POTS analog voice traffic and the high bandwidth data traffic. The data CLEC retains the high bandwidth data traffic and routes it to its terminating destination via a transport UNE from the wire center. The voice traffic is handed off to the voice provider via a cross-connect provided by the ILEC.

The second option is for the CLEC to locate the splitter in an area of the serving wire center outside of the CLEC's collocation arrangement but in a common area accessible to CLECs (depicted in Exhibit ___ (JPR/JCD-2)). In this scenario, a CLEC would receive the data traffic from the high bandwidth portion of the loop via a cross-connect, which runs from the MDF to the splitter and then from the splitter to the CLEC's collocation arrangement. Both the cross-connect from the MDF to the splitter, and the cross-connect required to obtain the voice traffic from the splitter, should be provided by the ILEC. In addition, the splitter may be purchased and owned by either the CLEC or the ILEC. If the ILEC owns the splitter, the CLEC should be able to designate the vendor from whom the ILEC purchases the splitter. Also, if the ILEC owns the splitter, the CLEC should be able to obtain the splitter functionality on an individual "port-at-a-time" basis. If the CLEC owns the splitter, the CLEC should also have full access rights to the splitter, and the right to perform isolation testing.

Under the third option, the CLEC locates the splitter in an area of the serving wire center controlled exclusively by the ILEC (depicted in Exhibit ___ (JPR/JCD-3)). Such an area would preferably include locations on or adjacent to the Main Distribution Frame. The CLEC should be allowed to choose whether to purchase and own the splitter itself, or to have the ILEC purchase the splitter (either from a third party vendor acceptable to the CLEC or from the CLEC). If the ILEC owns the splitter, the CLEC should be able to obtain the splitter functionality on an individual "port-at-a-time" basis, and the ILEC should be responsible for all maintenance and repair work. The CLEC would pick up high bandwidth data traffic from the loop via a cross-connect obtained from the ILEC. The cross-connect runs from the MDF to the splitter and then from the splitter to the CLEC's collocation arrangement. As with the second option, the ILEC should be responsible for providing the cross-connect required to obtain voice traffic from the splitter.

Q. HOW QUICKLY SHOULD THE ILEC PROVIDE THE SPLITTER FOR CLEC LINE SHARING?

A. As with the cross-connects discussed below, the ILECs should begin immediately to install splitters for use by CLECs in line sharing arrangements. The ILECs should complete the installation and provisioning of any splitter on an expedited basis, and complete installation within thirty calendar days of receipt of an order from a CLEC. This expedited timeframe should apply regardless of whether the splitter is located in the CLEC common area in the ILEC's space. As discussed below, ILECs should be installing splitters and cross-connects in bulk at wire centers. The splitter installation, like a cross-connect, is a simple installation, and is quite achievable in thirty days.

Q. ARE THERE ANY OTHER NETWORK ELEMENTS REQUIRED FOR CLECS TO PROVIDE LINE SHARING?

A. Yes. Under all three of the scenarios described above, the CLEC must have access to Interoffice Transport, which is provided by the ILEC as a UNE. The CLEC needs such Interoffice Transport UNEs to transport its high bandwidth data traffic between its collocation arrangement in the serving wire center and its point-of-presence, node, or collocation arrangement in a different wire center. CLECs will need access to a variety of Interoffice Transport bandwidths (*e.g.*, DS0, DS1, DS3, or OCn).

Q. WHY SHOULD ILECS SUPPORT A MENU OF OPTIONS?

A. Rhythms is not the only CLEC that will purchase line sharing arrangements from ILECs. CLECs will need flexibility to locate splitters in different areas of the central office. Such flexibility is very important to CLECs. The FCC has determined that line sharing is critical for CLECs to compete effectively with ILECs who have the ability to "line share" their POTS and data services now. Therefore, CLECs should be able to choose any of the three options for any given wire center in order to ensure CLECs have the widest range of choices. CLECs will need such options to address all of their needs, to adapt to a variety of space constraints and configurations, and to care for the varying abilities of ILECs to meet deadlines for deployment of facilities needed for line sharing.

Q. WILL ILEC DEPLOYMENT OF A "FIBER-FED DLC" ARCHITECTURE HAVE AN IMPACT ON CLECS' ABILITIES TO ENGAGE IN LINE SHARING?

A. Yes. While we will address this issue further in our Phase 2 testimony, it is important to note that the fiber-fed DLC arrangement is a new network configuration being deployed by ILECs. Some ILECs, such as SBC, have announced a very aggressive rollout of this configuration. Other ILECs expect to deploy this configuration over the next several years, supplanting the home run copper architecture in areas where fiber-fed DLCs are deployed. ILECs have advanced various arguments in support of their position that the FCC's line sharing mandate does not apply to the fiber-fed DLC architecture.

Based on our understanding of the FCC's line sharing order, we believe the FCC wanted CLECs to have access to line sharing arrangements for every loop, not just those served by home run copper. Otherwise, ILEC fiber based *plant modernization programs* would don the mantel of competition prevention. There are a number of critical issues that must be addressed to allow CLECs to engage in line sharing for fiber-fed DLC loops. However, resolution of those issues is not necessary to meet the FCC's June 6th implementation deadline. Rhythms has recommended that the Commission defer consideration of issues related to line sharing in the context of fiber-fed DLCs to a second phase of this proceeding.

V. <u>TECHNICAL INPUT ASSUMPTIONS UNDERPINNING RHYTHMS' PROPOSED COSTS AND PRICES.</u>

Q. HAVE YOU REVIEWED THE COST SUPPORT FOR THE PRICES THAT RHYTHMS IS PROPOSING IN PHASE 1 OF THIS ARBITRATION?

A. Yes, we have.

Q. TO THE EXTENT THAT THE COST SUPPORT CITES TO ENGINEERING SUBJECT MATTER EXPERT OPINION FOR INPUTS SUCH AS THE TASKS, TASK TIMES AND OCCURRENCE FACTORS REQUIRED TO PLACE AND REMOVE JUMPERS, DO YOU SUPPORT THE INPUT ASSUMPTIONS ON WHICH RHYTHMS' PROPOSED PRICES ARE BASED?

A. Yes, we do. We worked closely with the costing and pricing witnesses to review and comment upon all engineering input assumptions underlying Rhythms' proposed prices for line sharing over home-run copper. Based on our experience with efficient, forward-looking telecommunications engineering practices, we believe that the engineering-related input values represent reasonable values that an efficient incumbent local exchange carrier could achieve.

Q. DID YOU ALSO REVIEW THE ENGINEERING AND TASK TIME ASSUMPTIONS USED TO DEVELOP THE COST PER INCUMBENT-OWNER SPLITTER?

A. Yes. Again, we worked closely with the costing and pricing witnesses to review and comment upon all engineering input assumptions underlying that analysis and endorse those assumptions.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes. However, we reserve the right to supplement our testimony if additional issues are raised or additional evidence is presented and to file additional testimony in Phase 2 of this proceeding.

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PROFESSIONAL EXPERIENCE

TELECOMMUNICATIONS CONSULTANT 1992-Present

- Expert witness before the FCC and State Public Utilities Commissions.
- Engineering witness on behalf of AT&T, MCI Worldcom, Covad Communications, Rhythms Links Inc., and Mid-Maine Telephone Company.
- Testified in 14 jurisdictions on behalf of clients.
- Provided consulting services for the design, project management and implementation of national DSL company.
- Provided consulting services to equipment staging, assembly and installation company.

NYNEX 1987-1992

- Between 1987 and 1992, I was the NYNEX Engineering Director-Long Island. In that position, I was responsible for budgeting, planning, engineering, provisioning, assignment and maintenance of telecommunications services for all customers on Long Island, N.Y.

NYNEX 1985-1987

- Between 1985 and 1987, I was NYNEX District Manager-Midtown Manhattan. I was responsible for budgeting, planning, engineering, provisioning, assignment and maintenance of telecommunications services for all customers in Midtown Manhattan.

NYNEX 1980-1985

- Between 1980 and 1985, I was NYNEX District Manager-Engineering Methods. In that capacity, I was responsible for the design, development, implementation and review of all outside plant methods and procedures for New York Telephone Company. Additionally, I was responsible for the procurement of all outside plant cable and apparatus for the New York Telephone Company.

AT & T 1978-1980

- Between 1978 and 1980, I was an AT&T District Manager, responsible for the design, development and documentation of various Bell System plans, and for audits and operational reviews of selected operating companies in matters of Outside Plant engineering, construction, assignment and repair strategy. I also served as the Project Team Leader at Bell Telephone Laboratories for the design and development of functional specifications for mechanized repair strategy systems.

NEW YORK TELEPHONE 1976-1978

- Between 1976 and 1978, I was District Manager-Outside Plant Analysis Center for New York Telephone Company. I was responsible for the analysis of all outside plant maintenance reports and the design, development and implementation of related mechanized reporting, analytical and dispatching systems. I was also responsible for the procurement of all outside plant cable and apparatus for the New York Telephone Company.

VARIOUS

- Between 1962 and 1978, I held a variety of technical and engineering positions of increasing responsibility at New York Telephone and Bell Telephone Laboratories. During 1967 and 1969, I was on military leave of absence from New York Telephone while serving in the U.S. Navy.

EDUCATION

I hold a B.S. in Electrical Engineering from City College of New York, and have taken a variety of specialized courses in telecommunications since college.

RECENT TESTIMONY

State of Maryland	Docket No. 8731, Phase I
Commonwealth of Virginia	Case No. PUC 970005
State of New Jersey	Docket No. TX95120631 TX98010010
State of Pennsylvania	Docket No. A310203F0002 et al, MFSIII
State of West Virginia	Case Nos. 96-1516-T-PC 96-1561-T-PC 96-1009-T-PC 96-1533-T-T
State of California	Case Nos. R.93-04-003 I. 93-04-002
State of Wisconsin	Docket Nos. 6720-MA-104 3258-MA-101
District of Columbia	Formal Case No. 962
State of Delaware	PSC Docket No. 96-324
State of Iowa	Docket No. RPU 96-9
State of Hawaii	PUC Docket No. 7702
FCC	File No. E98-05
State of Illinois	Docket No. 99-0593 98-0396
State of New York	Case No. 98-C-1357

JOHN C. DONOVAN

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Website: http://www.telecomexpertwitness.com

Executive Summary

Expert witness in telecommunications for AT&T, MCI WorldCom, Covad Communications, Rhythms Links, the NYNEX Corporation (now Bell Atlantic), and other clients involving fiber optic damage claims, equipment damage claims, patent infringement law suits, a class action law suit, and cost estimation. Experience in setting major corporate strategy, imaginative and innovative problem solving, in-depth analysis, large scale project management involving engineering, physical construction and Information Services systems development. Expert in fiber optics and electronics. Extensive leadership and technical telecommunications background, especially in outside plant design, construction, maintenance, project implementation, cost estimating, network modeling theory, procurement, and logistics. Experienced lecturer and producer of material for presentations to customers and senior management, and in writing strategic position papers.

Professional Experience

Telecom Visions, Inc. **1996 - Present**
Garden City, New York
President

- *Nationally known expert witness before the FCC and state public utility commissions. Appeared before the FCC and 17 state jurisdictions[1] on behalf of AT&T, MCI WorldCom, Covad Communications, or Rhythms Links as a technical witness for implementation of the Telecommunications Act of 1996. Providing outside plant local loop expert advice and modeling theory for the HAI Model, a key economic model referenced by the FCC and various state jurisdictions to determine compliance with the Telecommunications Act of 1996, to set Unbundled Network Element Prices, and to determine the level of the multi-billion dollar Universal Service Fund.*
- *Expert witness for several U S Patent Infringement law suits, several fiber optic cable damage and telecommunications equipment damage cases, a service related class action law suit against a major regional telephone company, and others.*
- *Currently providing telecommunications consulting services involving various organizations and individuals, including telecommunications and data services management in the northeast for a major financial management firm, strategic advice on the effect of local loop competition to an equipment manufacturer, and valuation studies for due diligence, claims settlements, and other purposes.*
- *Provided Marketing Strategy for a large fiber optic multiplexer manufacturer introducing a new line of SONET based products, and worked with a major management consulting firm to provide advice to the government of Portugal.*
- *Manufacturer's representative for automated electronic cross connection devices.*

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[1] *Alabama, Arizona, Colorado, Georgia, Kansas, Louisiana, Maine, Maryland, Massachusetts, Missouri, Nevada, New Jersey, New York, Oklahoma, Pennsylvania, Texas, and Washington; advised witnesses and/or prepared testimony for California, Connecticut, Florida, Iowa, Illinois, Kentucky, Minnesota, Mississippi, Montana, North Carolina, North Dakota, New Hampshire, New Mexico, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, and Wisconsin.*

NYNEX **1994 - 1996**

New York City, New York

General Manager, Plug-In Management.

- *Led a group of 350 people in managing all NYNEX logistics functions for NYNEX's $10 billion investment in electronic printed circuit boards for switching systems and digital carrier systems.*
- *Responsibilities included purchasing, billing verification, warehousing, and repairing all NYNEX printed circuit boards.*
- *Scope of operation included average capital purchases of $1 million in new plug-ins per work day, and managing an expense budget of $30 million per year.*
- *Personally responsible for setting NYNEX's strategic direction in this area through major process re-engineering design. This effort included examining business plans, evaluating goals and objectives, and measuring effectiveness of achieving business plan goals. Efforts determined that major realignment was necessary.*
- *Results included consolidating 3 warehouses into one, 50% expense savings, improving repair intervals from 45 days to 5 days, and developing a multi-million dollar, "state-of-the-art" plug-in tracking system. The plug-in tracking system was a major Information Services development effort requiring large scale project management, definition of requirements, detailed design, and supervision of coding by contract programming companies.*

NYNEX **1991 to 1994**

New York City, New York

Managing Director, Engineering & Construction Methods & Systems.

- *Led a group of 115 managers and 45 contractors in maintaining existing computerized design and support systems for Central Office Engineers, Outside Plant Engineers, and Construction Managers that design and construct NYNEX's $2.4 billion annual capital construction program.*
- *Personally devised new, innovative methods for converting paper outside plant records to digital mapping formats, which reduced conversion costs from $150 million to $30 million. This innovative breakthrough has been the cornerstone of records conversion methods by successful companies such a Lucent and IGS (Information Graphics Systems Inc.).*
- *Devised a new Construction Work Management System[2] that mechanized the scheduling and reporting of work (profitability of 41% Rate of Return with a 2 year payback). Project managed a large scale IS development effort involving IS personnel recruited into the organization plus 35 contract IS development personnel from the Oracle Corporation. This multimillion dollar project was successfully completed, and upon completion comprised the second largest distributed platform developed in North America involving mini-computers and PCs.*
- *Supervised the development of all new Methods & Procedures for emerging technologies such as Fiber To The Curb, and for Open Network Architectures such as Signaling System 7 and Co-Location of Competitive Access Providers in telco switching centers.*

[2] *ECRIS – Engineering Construction Records information System.*

NYNEX **1989 - 1991**

Albany, New York

Director of Operations, Engineering & Construction, Northeastern Region, New York

- *Directed the overall operations of 600 employees and contract personnel to plan, engineer and construct pole line, conduit, fiber cable, copper cable, fiber optic multiplexers, and pair gain equipment to provide service throughout the Northeast region of New York State ($75 million annual budget supporting 86 central office switching center areas).*
- *Developed the NYNEX strategy of using a "business case" method for substantiating outside plant infrastructure improvements now used throughout the company.*
- *Helped create the "All Fiber Feeder" strategy implemented by NYNEX.*
- *Devised and implemented rapid fiber optic deployment to 225 sites in 16 months.*
- *Served as the Outside Plant Expert Witness for the 1990 Rate Case, providing the successful rebuttal case for the largest New York Public Service Commission Staff recommended disallowance of $110 million.*
- *Headed the Core Support Team handling the Public Service Commission Operational Audit of Outside Plant throughout New York Telephone.*

NYNEX **1989**

Albany, New York

Director, Customer Services Staff, Upstate New York

- *Directed the Upstate Vice President-Customer Services Staff in support of all 3 Upstate New York regions. Disciplines included Personnel & Training, Capital & Expense Budgets, Installation & Repair Operations, Business Offices, Outside Plant Construction & Engineering, and Facilities Assignment Centers.*

NYNEX **1987 - 1989**

New York City, New York

Director of Operations, Engineering & Facilities Assignment Centers, Midtown Manhattan

- *Directed a force of 150 personnel in engineering and assigning the rapid expansion of all local loop facilities in Midtown Manhattan (Approximately $40 Million Annual Budget).*
- *Worked to create NYNEX's strategy for the aggressive deployment of high technology to customer locations to meet competitor initiatives (primarily Teleport).*
- *In an area responsible for 25% of New York Telephone's revenues, rapid deployment of fiber optics to 450 buildings was achieved in less than 2-1/2 years.*
- *Worked with Lucent Technologies to invent the AUA-45 Private Line card used in their SLC-Series 5 Digital Loop Carrier system, saving New York Telephone $10 million.*
- *Made active sales calls to major customers to design private line networks and disaster recovery systems, resulting in $8 - $10 million in new sales revenue.*
- *Number 1 rated district manager in New York City.*

NYNEX Service Company (Corporate Staff) **1986 - 1987**

New York City, New York

Staff Director, Engineering & Construction Methods

- *Formed the first combined New York/New England corporate staff group supporting engineering and construction after divestiture.*
- *Developed strategies and directed the development of Central Office Engineering, Outside Plant Engineering, and Construction for New York and New England Telephone Companies.*
- *Efforts included start-up activities for the new organization, implementation of new Central Office Engineering design systems, trials on Digitized/Mechanized Outside Plant Records in Burlington*

Vermont, initiating a mechanized planning system for New England Telephone, and expanding the introduction of high technology into the local loop.

New York Telephone Company **1982 - 1985**

New York City, New York
Staff Manager, Corporate Staff, Outside Plant Engineering Methods

- *Corporate lightguide expert for Outside Plant.*
- *Authored the Manhattan Overlay Strategy for fiber optic deployment to over 650 commercial buildings.*
- *Conceived, supervised and implemented innovative rapid deployment plan for 13,500 fiber mile interoffice trunk project, completed in 5 months.*
- *Corporate Divestiture expert for Outside Plant.*
- *Wrote the post-divestiture Outside Plant Marketing Business Plan.*
- *Assigned all Outside Plant assets, and negotiated all Outside Plant contracts with AT&T Communications.*
- *Corporate evaluator for employee innovative suggestions.*
- *Corporate evaluator for major projects.*

New York Telephone Company **1980 - 1982**

Garden City, New York
Staff Manager, Long Island Area Staff.

- *Directed a staff group of 17 personnel to track, analyze, evaluate, and make recommendations to upper management concerning operational results for an 800 person Engineering, Construction and Facilities Assignment Center organization.*

New York Telephone Company **1974 - 1980**

Garden City, New York
Engineering Manager, Nassau County

- *Directed an operations center of 55 personnel responsible for cable TV coordination, conduit design, pole engineering, highway improvement coordination, securing Rights of Way, claims adjustments, drafting blue prints, and posting outside plant records.*
- *Supervised a Long Range & Current Planning group of 35 engineering personnel responsible for planning, design, project evaluation, and implementation of major feeder and trunk cable.*
- *Prepared and administered a $20 million per year construction program.*
- *Worked as a Long Range and Current Planner, Feeder Cable Design Engineer, Estimate Case Evaluator and Preparer, and Capital Program Administrator.*
- *Developed new budgeting methods, including writing 30-40 computer programs.*
- *Developed the Cost Estimating Program used by NYNEX and incorporated in the former Bell System JMOS Cost Estimating Model.*

New York Telephone Company **1972 - 1974**

Long Island, New York
Field Manager, Cable Maintenance and Construction, Nassau & Suffolk Counties

- *"Hands-on" craft through second level management experience in constructing and repairing outside plant cable, including analysis, locating, repair, dispatch, and cable trouble trend tracking.*
- *Developed several computer programming systems to track and analyze cable troubles.*

United States Army Signal Corps **1966 – 1970**
Germany; Viet Nam; Fayetteville, North Carolina
Captain

- *Airborne, Ranger, Decorated Viet Nam Veteran (Bronze Star Medal + others), Top Secret Clearance.*
- *Germany: Platoon Leader, Company Executive Officer, Battalion Operations Officer, Battalion Executive Officer*
- *Vietnam: Chief of the Communications Branch - Saigon Support Command*
- *Ft. Bragg, North Carolina: Battalion Communications Officer-82nd Airborne Division*

Education

Penn State Graduate School of Business **1988**
University Park, Pennsylvania
Executive Development Program

Purdue University Graduate School of Business **1970 - 1971**
West Lafayette, Indiana
MBA, Marketing & Finance

United States Military Academy **1962 - 1966**
West Point, New York
BS Electrical & Mechanical Engineering

Organizations

New York City Technical College **1987 - 1993**
Brooklyn, New York
Adjunct Professor of Telecommunications, Chairman of the Transmission Laboratory, Member of the Telecommunications Executive Committee, Member of the Board

Shenendehowa School Board **1991**
Clifton Park, New York
Served on the Technology Planning Committee for the local school board

AM/FM International **1993 - 1994**
Boulder, Colorado
Member of Executive Management Board, representing the telecommunications industry for the world's largest organization of digitized mapping and facilities management professionals.

Member of Various Other Organizations:
MENSA High IQ Society, IEEE, Amateur Radio Emergency Services group.

Recent Published Articles

"The Multi-Billion Dollar Outside-Plant Estimate Case", OSP Engineering & Construction Magazine, February 1999 issue, pp. 14-15. See this published article at: http://www.broadband-guide.com/cbl4man/standards/stand0299.html

Recent Testimony

- *United States District Court for the District of Minnesota;*

Case No. 98-CV-2055 DWF: Re: U.S. Patent No. Re. 34,955; ADC Telecommunications, Inc. Plaintiff, vs. Thomas & Betts Corporation and Augat Communications Products, Inc. Defendants; On behalf of Defendants Thomas & Betts Corporation and Augat Communications Products, Inc.;

Expert Report: March 26, 2000	Case still pending

- United States District Court for the Eastern District of New York;

Case No. 98 Civ. 5020 (DHR)(ETB)[1]: Re: U.S. Patent No. 4,600,814; Davox Corporation, Plaintiff vs. Manufacturing Administration & Management Systems, Inc., Defendants; On behalf of Davox Corporation, which is being accused of infringing U.S. Patent No. 4,600,814 by Manufacturing Administration & Management Systems, Inc.;

Expert Report: March 8, 2000	Deposition: Pending

- Insurance Claim, State of Texas:

Audubon Insurance Group Claim No. 316-53650-JJG, Charter Communications, Plaintiff vs. P. Penix Company, Defendant; Expert Report on behalf of Defendant's Insurance Carrier, Audubon Insurance Group;

Expert Report: February 1, 2000	Case still pending

- Before the New York Public Service Commission;

Case No. 98-C-1357: Re: Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements; On behalf of AT&T and MCI WorldCom, Inc.;

Prefiled Direct Testimony: January 22, 2000	Case still pending

- Before the Kansas Corporation Commission;

Docket No. 99-GIMT-326-GIT: Re: *In the Matter of an Investigation into the Kansas Universal* Service Fund (KUSF) Mechanism for the Purpose of Modifying the KUSF and Establishing a Cost-based Fund; On behalf of AT&T Communications of the Southwest, Inc.;

Prefiled Direct Testimony: November 16, 1999	Prefiled Rebuttal Testimony: November 22, 1999
Testimony & Cross Examination: November 30, 1999	

[1] Includes also 98 Civ. 6532 (DRH)(ETB) Manufacturing Administration & Management Systems, Inc., Plaintiff vs. ICT Group, Inc., Precision Response Corporation, RMH Teleservices, Inc. & Telespectrum Worldwide, Inc., Defendants; and also includes 98 Civ. 4687 (DHR)(ETB) EIS International, Inc., Plaintiff, vs. Manufacturing Administration & Management Systems, Inc., and William B. Cunniff, Defendants.

- Before the Missouri Public Service Commission;

Docket No. TO-2000-322: Re: In the Matter of an Investigation into the Kansas Universal Service Fund (KUSF) Mechanism for the Purpose of Modifying the KUSF and Establishing a Cost-based Fund; On behalf of AT&T Communications of the Southwest, Inc.;

Prefiled Direct Testimony: January 7, 2000	Prefiled Rebuttal Testimony: January 28, 2000
Prefiled Surrebuttal Testimony: February 10, 2000	Oral Deposition: February 8, 2000
Testimony & Cross Examination: November 30, 1999	

- Before the Kansas Corporation Commission;

Docket No. 99-GIMT-326-GIT: Re: In the Matter of an Investigation into the Kansas Universal *Service Fund (KUSF) Mechanism for* the Purpose of Modifying the KUSF and Establishing a Cost-based Fund; On behalf of AT&T Communications of the Southwest, Inc.;

Prefiled Direct Testimony: January 7, 2000	Prefiled Rebuttal Testimony: January 28, 2000
Testimony & Cross Examination: February 23, 2000	

- Before the New York Public Service Commission;

Case No. 98-C-1357 (DSL Track): Re: Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements; On behalf of Covad Communications Company, Rhythms Links Inc., and MCI WorldCom, Inc.;

Prefiled Affidavit: September 23, 1999	Prefiled Initial Testimony: October 18, 1999
Prefiled Responsive Testimony: Oct. 22, 1999	*Testimony & Cross Examination:* November 19, 1999

- Insurance Claim, State of New Jersey:

Wausau Insurance Companies Claim No. 324-016435, Answer Tel, Plaintiff vs. Bell Atlantic-New Jersey, Defendant; Expert Report on behalf of Defendants;

Expert Report: July 29, 1999	Settlement in favor of Defendant based on Expert Report: August 1999

- Before the Georgia Public Service Commission;

Docket No. 10692-U: Re: Generic Proceeding to Establish Long-Term Pricing Policies for Unbundled Network Elements; On behalf of AT&T Communications of the Southern States, Inc.;

Oral Deposition: June 17, 1999	Prefiled Testimony: June 30, 1999
Prefiled Rebuttal Testimony: July 9, 1999	Testimony & Cross Examination: July 13 & 14, 1999

- Before the Massachusetts Department of Telecommunications and Energy;

Docket Nos. *96-73/74, 96-75, 96-80/81, 96-83,* and *96-84*: Re: *Consolidated Petitions for* Arbitration of Interconnection Agreements – Dark Fiber; On behalf of AT&T Communications of New England, Inc.;

Prefiled Direct Testimony: September 25, 1998	Testimony & Cross Examination: February 17 & 19, 1999

- Before the Maryland Public Service Commission:

Docket No. 8786: Re: Investigation of Non-Recurring Charges for Telecommunications Interconnection Service; On behalf of AT&T Communications of Maryland, Inc. and MCI Telecommunications, Inc.;

Prefiled Rebuttal Testimony: November 16, 1998	Testimony & Cross Examination: January 15, 1999

- 19th Judicial District Court, East Baton Rouge, LA:

Case No. 436582, Division J, Petition for Damages: TCI Cablevision of Georgia, Inc. DBA TCI of Louisiana, Plaintiff vs. Barber Brothers Contracting, Inc., Defendant; Expert Report on behalf of Defendant's Insurance carrier Audubon Insurance Group;

Expert Report: December 30, 1998	Settlement in favor of Defendant based on Expert Report: February 5, 1999

- Before the Nevada Public Utilities Commission;

Docket No. 98-6005: Re: Filing of Central Telephone Company-Nevada d/b/a Sprint of Nevada's Unbundled Network Element (Unbundled Network Element) Cost Study; On behalf of AT&T Communications of Nevada, Inc.;

Prefiled Direct Testimony: July 1, 1998	Testimony & Cross Examination: August 12-13, 1998
Testimony & Cross Examination: December 7, 1998	

- Before the Nevada Public Utilities Commission;

Docket No. 98-6004: Re: Filing of Nevada Bell Unbundled Network Element (UNE) Cost Study; On behalf of AT&T Communications of Nevada, Inc.;

Prefiled Direct Testimony: July 1, 1998	Prefiled Supplemental Testimony: September 3, 1998
Testimony & Cross Examination: September 19, 1998	Testimony & Cross Examination: December 3, 1998

- United States District Court for the Southern District of New York;

Civil Action No. 95-CV-7052 (BSJ): Re: U.S. Patent No. 4,706,275; Aerotel, Ltd., and Aerotel U.S.A., Inc., Plaintiffs, vs. National Applied Computer Technologies, Hello Card, Inc., GST Telecommunications, Inc., GST USA, Inc., Thomas Sawyer, and Kyle Love, Defendants; On behalf of Plaintiffs;

Expert Report: June 26, 1998	Case settled in favor of plaintiffs in late 1998

- Before the Alabama Public Service Commission;

Docket No. 25980: Re: Implementation of Universal Service Requirements of Section 254 of the Telecommunications Act of 1996; On behalf of AT&T Communications of the South Central States, Inc.;

Prefiled Direct Testimony: February 3, 1998	Prefiled Rebuttal Testimony: February 13, 1998
Testimony & Cross Examination: February 26, 1998	

- Before the Louisiana Public Service Commission;

Docket U-20883, Subdocket A: In re: Submission of the Louisiana Public Service Commission's Forward-Looking Cost Study to the FCC for Purposes of Calculating Federal Universal Service Support Pursuant to LPSC order No. U-20883 (Subdocket A), dated August 12, 1997; On behalf of AT&T Communications of the South Central States, Inc.;

Prefiled Direct Testimony: January 9, 1998	Prefiled Rebuttal Testimony: January 20, 1998
Oral Deposition: January 21, 1998	Testimony & Cross Examination: January 30, 1998

- Before the State of Maine Public Utilities Commission;

Docket No. 97-505: In re: Public Utilities Commission Investigation of Total Element Long-Run Incremental Cost (TELRIC) Studies and Pricing of Unbundled Network Elements; On behalf of AT&T Communications;

Testimony & Cross Examination: December 2, 1997	Written Testimony: December 22, 1997

- Before the State of New Jersey Board of Public Utilities;

Docket No. TX95120631: In the Matter of the Board's Investigation Regarding Local Exchange Competition for Telecommunications Services; On behalf of AT&T Communications of New Jersey, Inc. and MCI Telecommunications Corp.;

Oral Deposition: October 27, 1997	

- Before the Pennsylvania Public Utility Commission;

Docket No. I-00940035: In re: Formal Investigation to Examine and Establish Updated Universal Service Principles and Policies for Telecommunications Services in the Commonwealth; On behalf of AT&T Communications of Pennsylvania, Inc. and MCI Telecommunications Corp.;

Testimony & Cross Examination: October 21 & 23, 1997	

- Before the Georgia Public Service Commission;

Docket No. 10692-U: Re: Generic Proceeding to Establish Long-Term Pricing Policies for Unbundled Network Elements; On behalf of AT&T Communications of the Southern States, Inc.;

Oral Deposition: August 28, 1997	

- Before the Public Utilities Commission of the State of Colorado

Re: The Investigation and Suspension of Tariff Sheets Filed by U S WEST Communications, Inc. with Advise Letter No. 2617, Regarding Tariffs for Interconnection Local Termination, Unbundling, and Resale of Services; On behalf of AT&T of the Mountain States and MCI Telecommunications Corporation;

Oral Deposition: April 9, 1997	

- Before the Arizona Corporation Commission;

Docket No. U-2428-96-417: In the Matter of the Petition of AT&T Communications of the Mountain States, Inc. for Arbitration with U S WEST Communications, Inc. of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996; On behalf of AT&T Communications of the Mountain States;
Docket No. U-3175-96-479: In the Matter of the Petition of MCI Metro Access Transmission Services, Inc. for Arbitration of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996; On behalf of MCI Metro Access Transmission Services, Inc.

Prefiled Direct Testimony: October 25, 1996	Testimony & Cross Examination: November 20, 1996

- Before the State Office of Administrative Hearings for the Public Utility Commission of Texas, Austin, Texas;

Docket No. 16226: Petition of AT&T Communications of the Southwest, Inc. for Compulsory Arbitration to Establish an Interconnection Agreement Between AT&T and Southwestern Bell Telephone Company; On behalf of AT&T of the Southwest;
Docket No. 16285: Petition of MCI Telecommunications Corporation and Its Affiliate MCIMetro Access Transmission Services, Inc. for Arbitration and Request for Mediation Under the Federal Telecommunications Act of 1996; On behalf of MCI Telecommunications Corporation;

Oral Deposition: August 30, 1996	Testimony & Cross Examination: October 2-3, 1996

Line Sharing on Home Run Copper - Figure 1

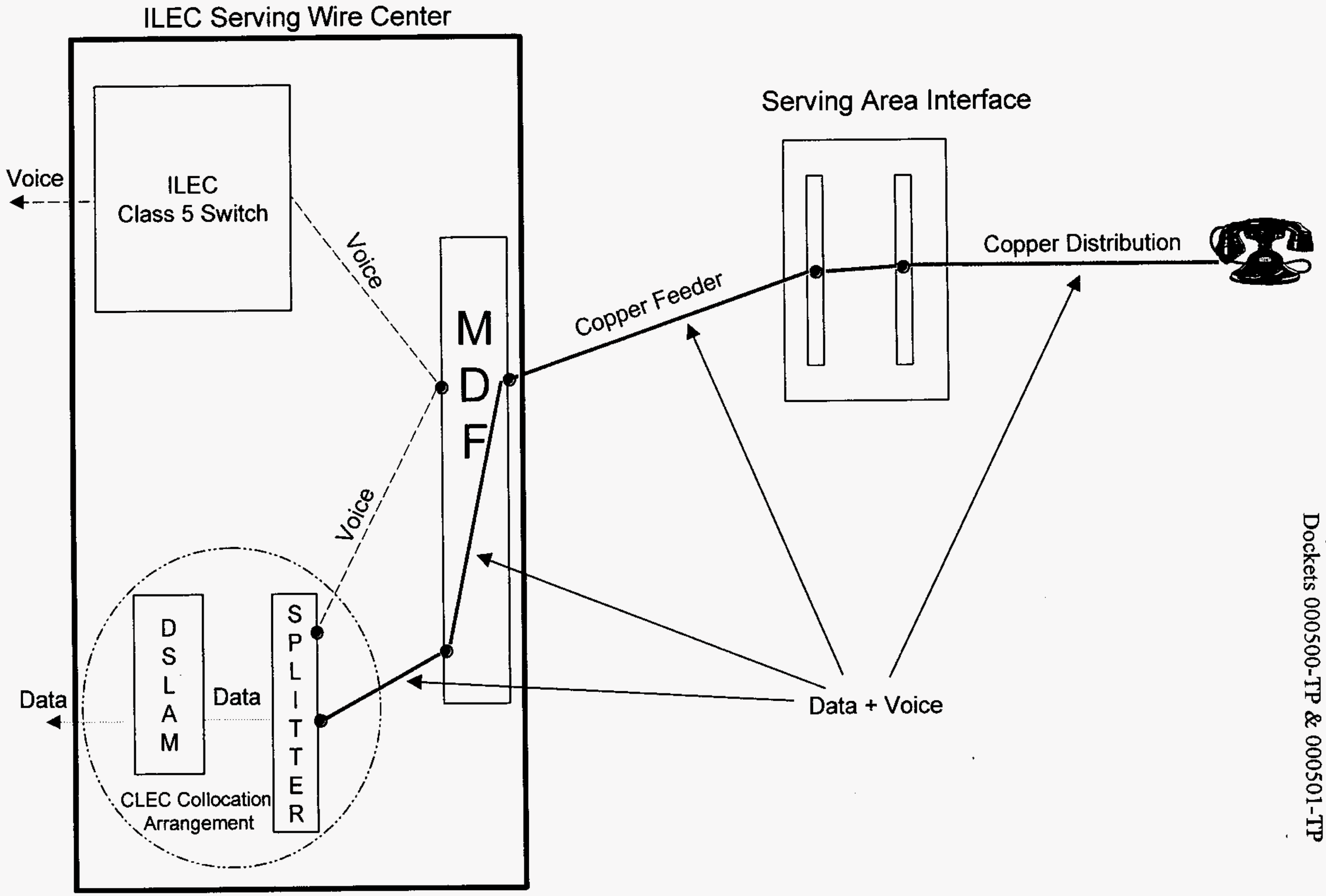


Exhibit ____ (JPR/JCD-1)
Rhythms: Riolo/Donovan
Dockets 000500-TP & 000501-TP

Line Sharing on Home Run Copper - Figure 2

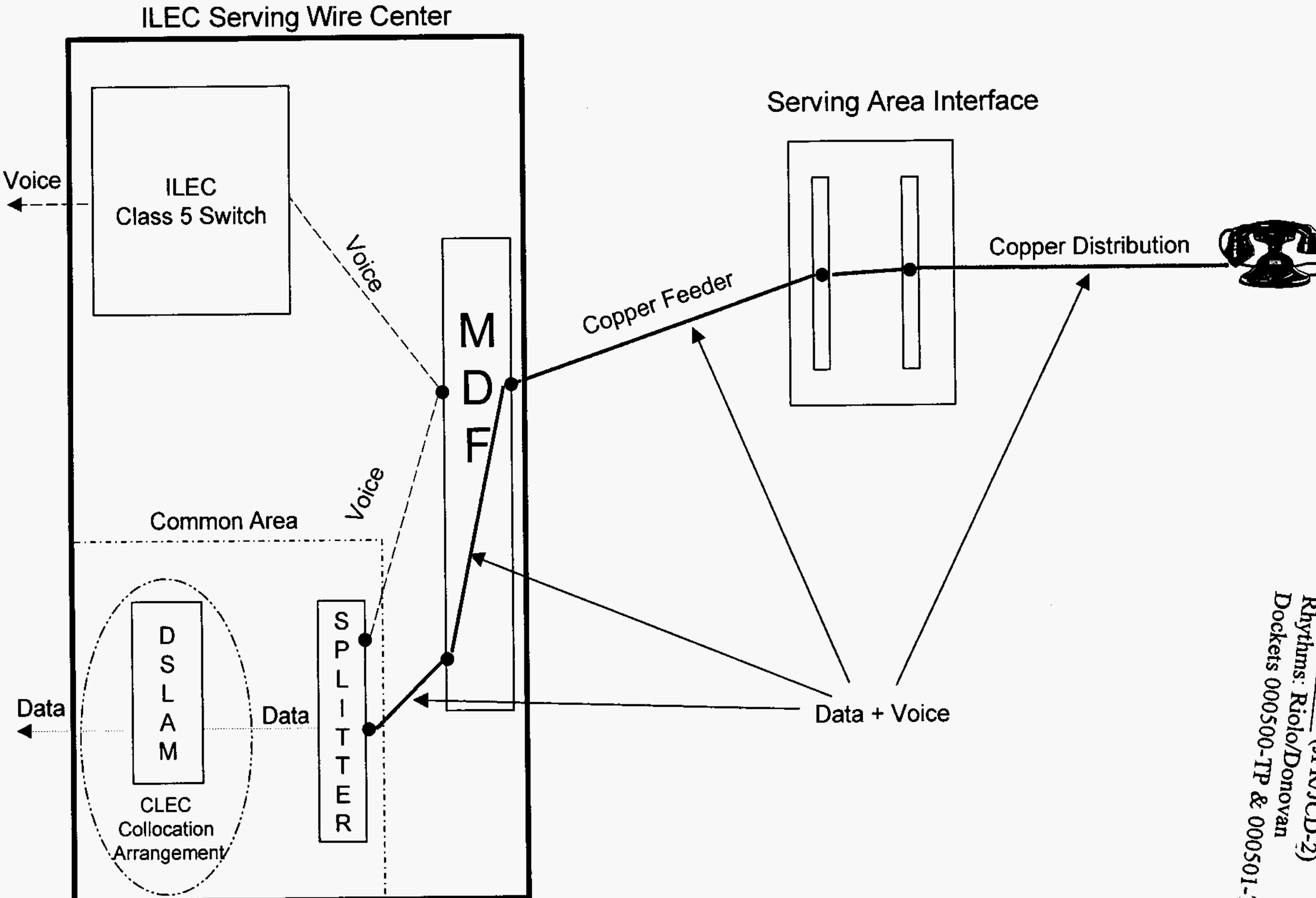


Exhibit ____ (JPR/JCD-2)
Rhythms: Riolo/Donovan
Dockets 000500-TP & 000501-TP

Line Sharing on Home Run Copper - Figure 3

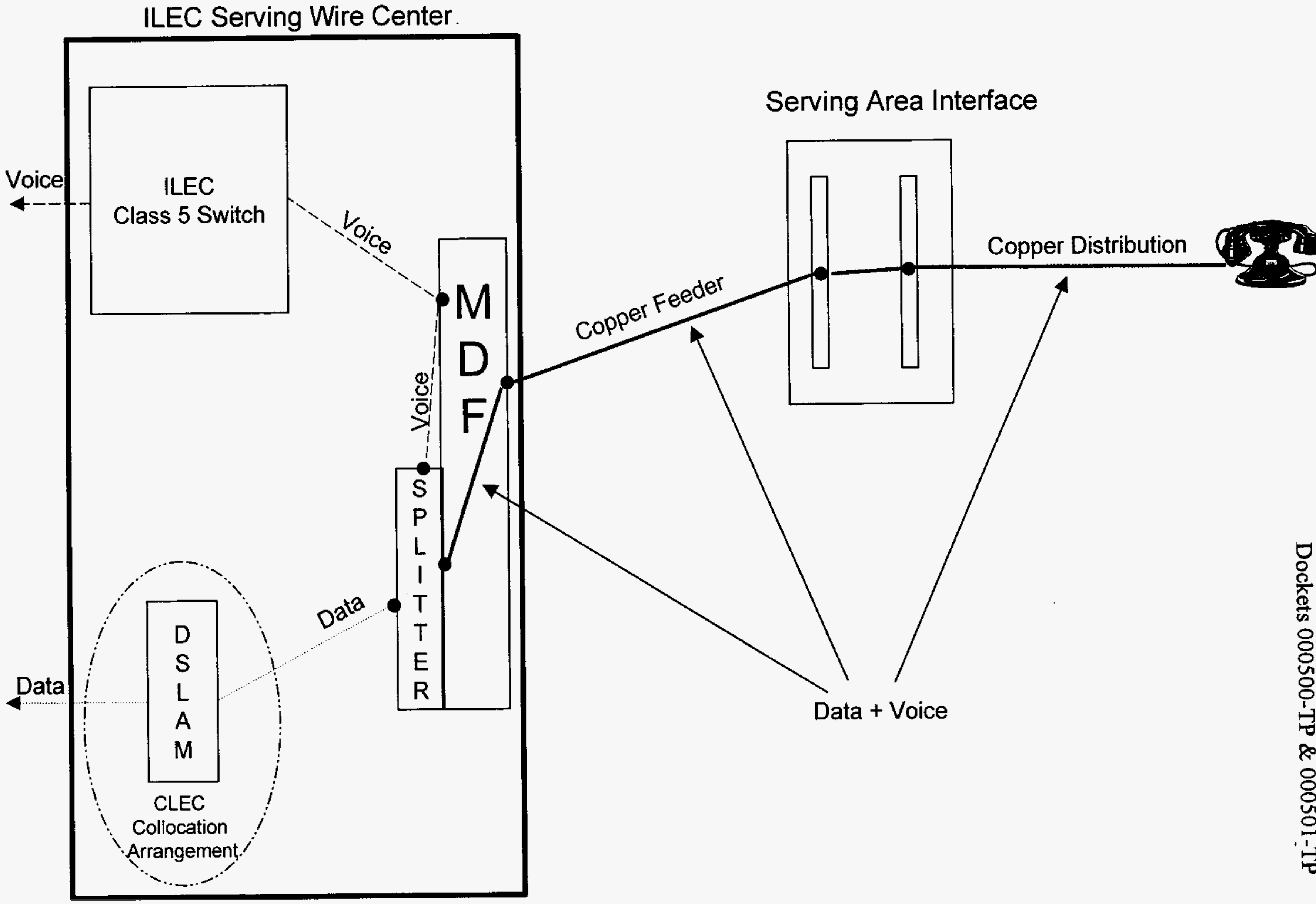
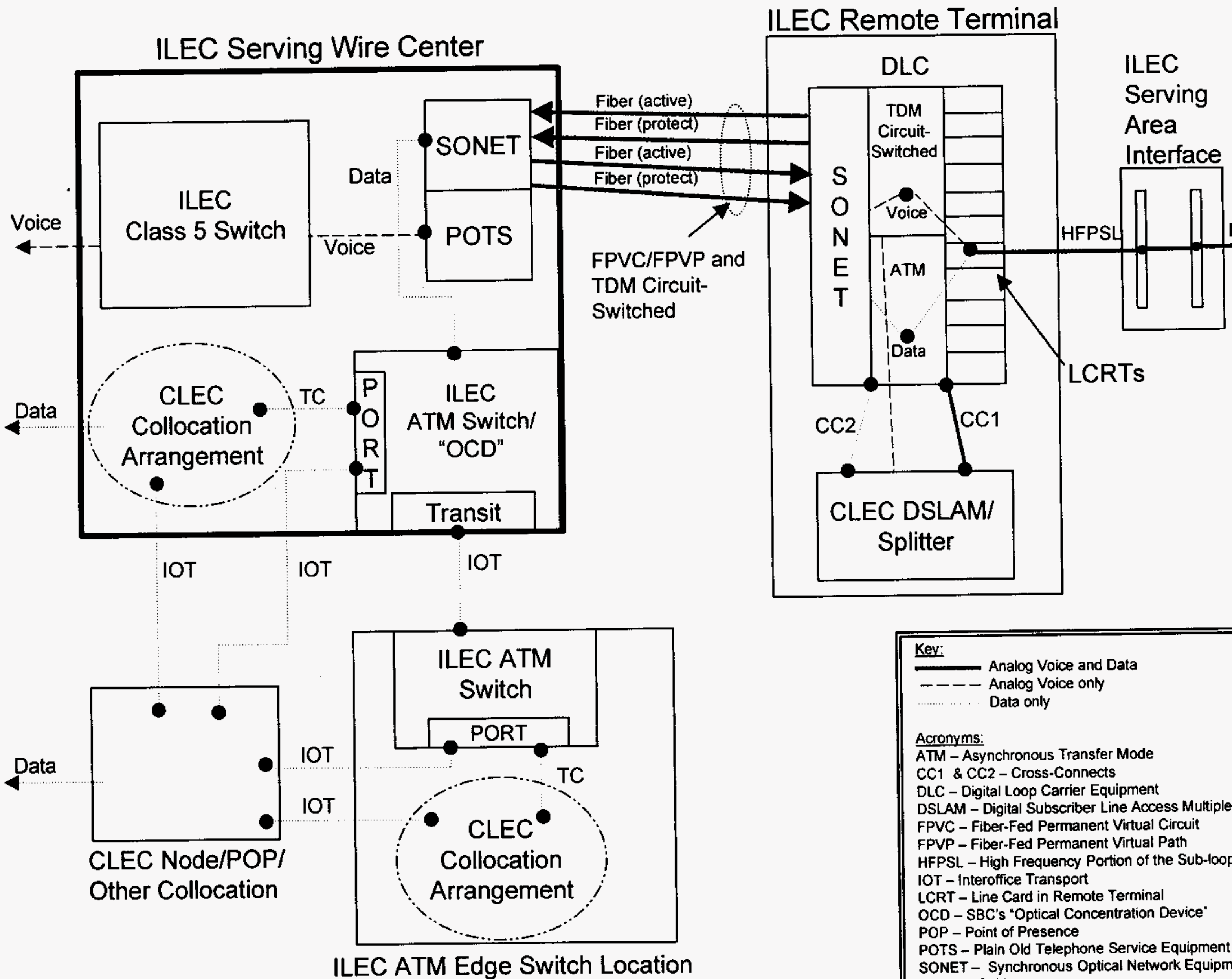


Exhibit ____ (JPR/JCD-3)
Rhythms: Riolo/Donovan
Dockets 000500-TP & 000501-TP

Line Sharing on Fiber-Fed DLC - Figure 4



Key:

- Analog Voice and Data
- Analog Voice only
- Data only

Acronyms:

- ATM – Asynchronous Transfer Mode
- CC1 & CC2 – Cross-Connects
- DLC – Digital Loop Carrier Equipment
- DSLAM – Digital Subscriber Line Access Multiplexer
- FPVC – Fiber-Fed Permanent Virtual Circuit
- FPVP – Fiber-Fed Permanent Virtual Path
- HFPSL – High Frequency Portion of the Sub-loop
- IOT – Interoffice Transport
- LCRT – Line Card in Remote Terminal
- OCD – SBC's "Optical Concentration Device"
- POP – Point of Presence
- POTS – Plain Old Telephone Service Equipment
- SONET – Synchronous Optical Network Equipment
- TC – Tie Cable
- TDM – Time Division Multiplexed

Exhibit ___ (JPR/JCD-4)
Rhythms: Riolo/Donovan
Dockets 000500-TP & 000501-TP