Before the

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of The Continued Costing and Pricing of Unbundled Network Elements and Transport and Termination	)	Docket No. UT-003013

DIRECT TESTIMONY OF MICHAEL ZULEVIC ON BEHALF OF RHYTHMS LINKS INC. AND COVAD COMMUNICATIONS COMPANY

May 19, 2000

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I. INTRODUCTION

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

A. My name is Michael Zulevic. I am the Director of Network Deployment in the Central Region for Covad Communications Company. I am also responsible for architecture negotiation and the deployment of Covad's national line sharing network.. My business address is 8413 E. Jamison Circle, Englewood CO, 80112.

Q. PLEASE DESCRIBE YOUR RELEVANT WORK EXPERIENCE.

A. Prior to joining Covad, I was employed by U S WEST for 30 years, most recently as Manager, Depreciation and Analysis. Prior to that, I worked in Network and Technology Services, providing technical support to U S WEST Interconnection Negotiation and Implementation Teams. While working in these two capacities, I provided testimony on technical issues in support of arbitration cases and/or cost dockets in Minnesota, Iowa, Montana, Washington, Oregon, Arizona, New Mexico, Nebraska, Utah, Wyoming, and Idaho. Prior to this assignment, I was responsible for providing technical support for the U S WEST capital recovery program in the areas of switching, transport, and loop. I also worked as a Central Office Technical and Central Office Supervisor at U S WEST.

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My other experience includes the following: Switch and Transport Fundamental Planning Engineer, where I represented Fundamental Planning as a member of the ONA/Collocation Technical Team; Circuit Administration Trunk Engineer, specializing in switched access services; and Custom Network Design and Implementation Engineer working with the design and implementation of private networks for major customers.

II. PURPOSE AND OVERVIEW

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I 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 Washington.

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

A. My Testimony begins by defining the term line sharing and describes the technical components of the telephone network required for line sharing. I then address the options that competitive local exchange carriers ("CLECs") must have available to provide xDSL for customers on a line-shared loop. Next, I describe those unbundled network elements ("UNEs") that Washington ILECs need to provide to CLECs for line sharing.

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III. TECHNICAL DEFINITION OF LINE SHARING

Q. PLEASE DEFINE THE TERM "LINE SHARING."

A. "*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 of 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. In addition, consumers will benefit from competitive DSL pricing 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 a separate physical loop to meet their voice and data transmission needs. Rather they need only pay for a single loop to meet both needs. Moreover, assuming that the line sharing network elements are properly priced, CLECs will have access to the same competitive advantages that ILECs now enjoy by being able to offer xDSL service over an existing ILEC

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POTS line.

Q. PLEASE DEFINE THE TERM "xDSL."

A. "DSL" is an acronym for Digital Subscriber Line. "X" is a placeholder for the various types of Digital Subscriber Line technologies, and is used when referring generally to DSL. DSL 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 from the central office to the customer premises ("Home Run Copper"). However, with the current 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.

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

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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. G.Lite, also known as "splitterless DSL" is a throughput limited version of ADSL that is used on loops with simple filters, rather than splitters, at the subscriber end. (G.Lite therefore eliminates the requirement for an expensive and time consuming splitter installation at the customer premise.)

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

A. Currently, ADSL and its variants, including RADSL and G.lite, can be provided concurrently on a loop with POTS. These technologies are compatible with POTS because both the downstream and upstream data signals, which are transmitted on different frequencies, fall within a range above the frequencies used to transmit voice signals. The technologies that make DSL possible, however, are rapidly advancing and it is certainly possible that other, new xDSL services will be developed in the future to be compatible with POTS on the same loop.

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

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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.

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IV. NETWORK COMPONENTS REQUIRED FOR LINE SHARING

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 central office equipment and transport UNEs required 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. PLEASE EXPLAIN THE GENERAL LINE SHARING TRANSMISSION PATH.

A. As explained in MZ-2, Figures 1 through 4, attached to this testimony, there are two different network configurations for line sharing. It is important to note that many ILECs have acknowledged that they intend to provide line sharing over both of these configurations.

The first, which I 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. Exhibit MZ-2, Figures 1 through 3 each show a copper distribution pair that 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.

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This copper feeder pair terminates in an appearance on the loop side of the MDF, located in the ILEC's serving wire center. From the MDF, that loop is then connected via a tie cable to a splitter, where the low bandwidth (for POTS) and the high bandwidth (for data) are separated.

As I explain below, the three different home-run copper arrangements pictured in Exhibit MZ-2 Figures 1 through 3 reflect three different possible locations for the central office splitter used to provide line sharing over home run copper loops: (a) via a tie cable to the CLEC collocation arrangement, where it connects with splitter/Digital Subscriber Line Access Multiplexer ("DSLAM") equipment that the CLEC owns (see Exhibit MZ-2 Figure 1); (b) via a tie cable to a common splitter location available to all CLECs (see Exhibit MZ-2 Figure 2); or (c) via a splitter at the distribution frame (or another incumbent controlled area in the central office near the MDF (see Exhibit MZ-2 Figure 3).

The second network configuration for line sharing, which I 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. The FCC's line sharing order requires ILECs to provide line sharing through fiber fed DLCs (digital loop carriers), but there is no agreement that I am aware of in Washington that provides an abilty to do that.

To date, SBC is the only ILEC I know that has discussed with CLECs how to provide this type of line sharing. Exhibit MZ-2 Figure 4 illustrates our current

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understanding of the appropriate forward looking method of provisioning the type of fiber fed DLC line sharing that is being discussed with SBC. Because this network architecture has not been finalized, and because it has not even been discussed in Washington, I am providing this diagram for information purposes only. Covad and Rhythms will not be providing a pricing proposal for fiber-fed DLC line sharing at this time. Instead, we suggest that the Commission consider this either in a later proceeding or a later phase of this proceeding.

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 have access to a splitter which separates the data signal from the voice signal and directs the data signal to a collocated DSLAM.

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

A. There are three possible locations for the splitter in a wire center. The CLEC can purchase and own a splitter located in the CLEC's collocation arrangement (depicted in Exhibit MZ-2 Figure 1). In this scenario, both the POTS and data traffic will arrive at the CLEC collocation arrangement via a tie cable obtained from the ILEC. At the collocation arrangement, the tie cable will terminate at the

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splitter, which will separate the POTS analog voice traffic and the high bandwidth data traffic. The data CLEC retains the high bandwidth data traffic, directs it from the splitter to its DSLAM, and then to its terminating destination via a transport UNE from the wire center. The voice traffic is handed off to the voice provider via a tie cable provided by the ILEC.

Another 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 on an equipment rack in a common area of the central office (depicted in Exhibit MZ-2 Figure 2). In this scenario, a CLEC would receive the data traffic from the high bandwidth portion of the loop via a tie cable, which runs from the MDF to the splitter and then from the splitter to the CLEC's collocation arrangement. The tie cable from the MDF to the splitter, the tie cable required to obtain the voice traffic from the splitter, and the tie cable required to obtain the data 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 indicate the preferred vendor from whom the ILEC should purchase the splitter. Also, if the ILEC owns the splitter, the CLEC should be able to obtain the splitter functionality either in bulk, i.e., on a shelf at a time basis, or on an individual "port-at-a-time" basis. In either case, the CLEC should also have full access rights to the splitter, and the right to perform isolation testing.

Finally, as depicted in Exhibit MZ-2 Figure 3, the splitter can be located directly on the Main Distribution Frame. As with the previous arrangement, the CLEC

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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" or on a bundled basis, depending on the CLEC's preference, and the ILEC should be responsible for all maintenance and repair work. However, the CLEC must also be provided test access to the splitter as required to provide and insure the quality of its xDSL service. With this arrangement the CLEC would pick up high bandwidth data traffic from the loop via a tie cable obtained from the ILEC. The tie cable runs from the splitter at the MDF to the CLEC's collocation arrangement. As with the second option, the ILEC will provide the tie cable required to obtain data traffic from the splitter. The most efficient forward looking network design calls for the placement of splitters on the horizontal side of the MDF.

Q. WHAT IS THE MOST EFFICIENT METHOD OF DESIGNING, INSTALLING, AND CONNECTING SPLITTERS?

A. The last option I described, placing the splitter directly on the ILEC's distribution frame, is the most efficient method to provide line sharing over home run copper loops. To maximize efficiency with this arrangement CLECs should be able to order traditional tie cables from the ILEC distribution frame to the CLEC's collocation arrangement to be terminated directly onto the frame mounted splitters. With pre-connection to the data side of splitters at the MDF and to a CLEC's collocated DSLAM via a tie cable, line sharing would then be

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accomplished by placing two MDF cross connection pairs (i.e., jumpers). The first jumper connection would run from the splitter to the vertical outside plant side of the MDF taking the entire spectrum of the loop to the splitter. The second jumper would run from the splitter to the horizontal switch side of the MDF with the end user's voice grade service signal[1]. This arrangement is shown below as *Figure 1.*

Q. SHOULD COSTS AND PRICES BE BASED ON THE MDF MOUNTED SPLITTER METHOD?

A. Yes. Dr. Cabe explains in his Testimony why costs and prices should be based on this most efficient MDF mounted splitter method. The ILEC may prefer other arrangements or might seek to impose terms and conditions (such as limiting

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[1] *There should be no recurring charges for this jumper, since it duplicates the functionality of the ILEC's original jumper used for its own POTS service.*

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access to the splitter in some locations) that require CLECs to accept other arrangements. Regardless of what arrangements the ILEC is ultimately willing to allow, line sharing costs and prices should be based on the most efficient method. If a determination is made that an MDF mounted splitter method cannot be implemented, then the CLEC should have the option of designating what alternative should be deployed, while pricing is retained at a level that meets the most efficient standard.

Q. WHO IS RESPONSIBLE FOR PROVIDING THE VARIOUS PIECES OF EQUIPMENT NEEDED TO PROVIDE XDSL?

A. ILECs must provide the high bandwidth portion of the loop as an unbundled network element ("UNE"). ILECs provide new tie cables under CLECs' existing collocation arrangements. CLECs may reuse existing tie cables via connection facility assignments ("CFAs"). 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. 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

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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. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY AT THIS TIME?

A. Yes, it does.

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