BEFORE THE MAINE PUBLIC UTILITIES COMMISSION

INVESTIGATION INTO LINE SHARING PURSUANT TO STATE LAW

DOCKET NO. 2004-809

DIRECT TESTIMONY

OF ROBERT LOUBE, Ph.D.

ON BEHALF OF

OFFICE OF PUBLIC ADVOCATE

FEBRUARY 9, 2005

TABLE OF CONTENTS
TESTIMONY OF
ROBERT LOUBE

LOUBE EXHIBIT LIST

I. INTRODUCTION

Q: Please state your name and business address.

A: My name is Robert Loube. My business address is 10601 Cavalier Drive, Silver Spring, Maryland 20901.

Q: By whom are you employed and in what capacity?

A: I am the Director, Economic Research, Rhoads and Sinon, LLC.

Q: On whose behalf are you testifying?

A: I am testifying on behalf of Office of Public Advocate (OPA).

Q: Please describe your professional qualifications.

A: I received my Ph.D. in economics from Michigan State University in 1983. I previously worked for the Federal Communications Commission (FCC) where I helped to establish the criteria for choosing the universal service economic cost model, evaluated and modified telephone cost models, and determined the input values used in the FCC's Synthesis model.

While I worked at the Indiana Utility Regulatory Commission and the Public Service Commission of the District of Columbia, I testified on the validity and usefulness of a number of incremental and embedded cost studies, and on the conditions required for competition in telephone markets. I testified on behalf of the Pennsylvania Office of Consumer Advocate in the Pennsylvania Triennial Review proceeding and filed expert testimony on behalf of the South Carolina Public. I have lectured on cost modeling and pricing in telecommunications at the NARUC Annual Regulatory Studies Program. My vita is attached to this testimony as Exhibit RL-1.

II. PURPOSE OF TESTIMONY

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to provide the Commission with recommendations regarding its "Straw Man" Proposal. As a starting point in that evaluation, I will define line sharing and discuss the relationship between line sharing and Digital Loop Carrier (DLC) technology. I will also summarize the information contained in replies to OPA data requests regarding the availability of DSL service. Finally, I will recommend that the Commission require incumbent local exchange carriers to offer a line-sharing UNE in certain situations.

III. Line Sharing

Q: What is line sharing?

A: In general, line sharing occurs when two different service providers offer two services over the same line. In particular, it means that the incumbent local exchange carrier (ILEC) offers plain old telephone service (POTS) using the low frequency portion of the loop, and a competitive local exchange carrier (CLEC) or Internet Service Provider (ISP) offers high speed data transmission service using the high frequency portion of the loop (HFPL).[1]

Q: How is line sharing provisioned?

A: The line-sharing arrangement includes a DSL compatible loop, the necessary cross-connections and the splitters. An illustration of DSL service is shown in

[1] The low frequency portion ranges up to 3.4kHz, while the high frequency portion used for ADSL service ranges from 25kHz to 1000kHz; See George Abe, Residential Broadband, Cisco Press, pages 181-183.

Exhibit 2.[2] The service arrangement starts from the customer's premises. It uses a modem and splitter arrangement to combine the voice and data traffic onto a DSL compatible loop. Upon arriving at the wire center, the loop is connected from a distribution frame to a splitter. The splitter passes the data traffic to a Digital Subscriber Line Access Multiplixer (DSLAM) and the voice traffic follows a path to a circuit switch. In a line sharing arrangement, the DSLAM would be owned by the CLEC and located in the CLEC's collocation space.

Q: In its line sharing order, did the FCC place any limitations on the provision of the line-sharing service?

A: Yes. First line sharing was only made available on copper loops.[3] Second, the digital subscriber loop technology employed by the CLEC must be compatible with the voice technology. ADSL among other technologies is compatible with normal POTS service.[4] Third, the FCC ruled that ILEC would remain the voice carrier.[5] Finally, ILECs did not have to condition the loop to make the loop compatible with DSL service, if such conditioning would degrade the provision of voice service. The FCC found that it would be unreasonable for an ILEC to refuse to condition a loop if the loop was less than 18,000 feet. For loops greater than 18,000, ILEC could make an affirmative showing that such degradation would occur.[6]

---

[2] Exhibit 2 is a copy of Appendix C of the FCC's Third Report and Order, In the Matter of Deployment of Wireline Service Offering Advanced Telecommunications Capability, CC Docket No. 98-147, FCC 99-355, (" Line Sharing Order") released December 9, 1999.
[3] Id, footnote 27.
[4] Id, ¶ 71, and SBC Comments at 25-27.
[5] Line Sharing Order, ¶72.
[6] Id, ¶¶ 81-87.

Q: Has the FCC ever required a carrier to provide line sharing in a fiber-DLC environment?

A: As part of the modifications of the conditions related to the SBC/Ameritech merger, the FCC required SBC to offer line sharing in a fiber-DLC environment. This provision allowed competitors to provide advanced services to customers served by new DLCs in SBC's territory.[7]

Q: How does line-sharing operate in a fiber-DLC environment?

A: Exhibit 3 illustrates the provision of line sharing using a DLC and fiber feeder.[8] The combined data and voice traffic travels on a copper sub-loop from the end-user's home or office to the DLC. At the DLC, the loop is terminated using ADSL digital line unit card. The DLC, by combining the functions embedded in the line card with additional equipment, performs the functions of the splitter and DSLAM.[9] Once the traffic has been separated, the voice traffic is transported via an OC-3 connection to a distribution frame and then to the ILEC's circuit switch. The data traffic is transported via a separate OC-3 connection to an optical concentration device that routes the traffic to the CLEC.

Q: Why did you discuss line sharing in the fiber-DLC environment?

A: My discussion of this type of line sharing is intended to illustrate that in order to provide broadband services in a DLC environment, it is necessary to upgrade the DLC with ADSL digital line unit cards and associated equipment. A DLC without this equipment will block the provision of broadband services. In the

[7] The Second Memorandum Opinion and Order, In the Matter of Ameritech, transferor and SBC Communications, Inc, transferee, CC Docket No. 98-141, ("SBC Merger Order"), released September 8, 2000.
[8] Id, Appendix B.

FCC's line sharing docket, the Rural Telephone Coalition (RTC) commented that its current installed base of DLCs makes the provisioning of DSL service extremely difficult because DSL service depends on copper technology and many of their DLCs are connected to the wire center on a fiber path. In addition, the RTC commented that engineering solutions to this problem would require replacement of a significant portion of the embedded DLC investment.[10] Thus, in order to determine whether DSL services are available to customers served via DLC equipment, it is necessary to know whether the particular DLC has been upgraded to provide broadband services.

IV. Broadband Availability

Q: What do you mean by broadband availability?

A: For the purposes of this testimony, I define broadband availability as the possibility to obtain service through a DSLAM. The DSLAM can either be in the wire center or incorporated into the functions provided by the DLC. It is important to realize that even if a DSLAM is present at the wire center that provides switching service to a particular line, that, in general, a line served through a DLC cannot obtain broadband service through the DSLAM. Moreover, the existence of the DSLAM does not guarantee that there is sufficient capacity to serve all lines at the wire center. Therefore, it is necessary to compare the capacity of the DSLAM(s) at the wire center to the number of lines at the wire center.

[9] Id, footnote 11.
[10] RTC Comments, FCC CC Docket No. 98-147, June 15, 1999, at 14.

Q: Please describe the broadband availability in the Verizon service territory.

A: Verizon has placed DSLAMs in 111 wire centers.[11] Verizon reports that **Begin Proprietary** * **End Proprietary** of its total switched access lines, are served at those wire centers without the use of a DLC. There are **Begin Proprietary** * **End Proprietary** of Verizon's switched access, at wire centers without DSLAMs. There are **Begin Proprietary** * **End Proprietary** in this category, and each wire center serves less than 5,000 lines. In addition, Verizon serves **Begin Proprietary** * **End Proprietary** using DLCs. The DLCs serving **Begin Proprietary** * **End Proprietary** do not have the DSLAM functionality, and therefore, broadband service is not available to these lines. Currently, Verizon has no plans to upgrade or replace DLCs with DSLAM functionality in 2005 or beyond. These plans, however, are subject to change given a change in the market demand, capital availability or work force demands.[12]

Exhibit 4 shows the percentage distribution of Verizon's lines by DSLAM availability and DLC service. The graph clearly shows that for lines served directly from the wire center, broadband availability is pervasive.[13] On the other hand, for lines served via DLCs representing **Begin Proprietary** * **End**

[11] The data in this answer includes lines served from wire centers located in Maine. Lines served from wire centers located in New Hampshire are excluded from the analysis because it appears that Verizon Maine is not able to obtain information regarding the presence of DSLAMs in the New Hampshire offices.
[12] Verizon's reply to OPA data request no. 1-6.
[13] It is important for the Commission to understand that I was not able to ascertain whether the remote terminals where greater than 18,000 feet from the wire center because Verizon did not provide an address that could be geo-coded for the DLC remote terminal. If Verizon provides a geo-coded remote address or a street address that I can geo-code, then I will be able to determine whether the customers served from the wire center are within 18,000 of the wire center.

Proprietary of Verizon's total switched lines, DSLAM functionality is not available in Verizon's DLCs.

Q: What is the relative distribution of DSLAM functionality among Verizon's wire centers?

A: In general, the large wire centers are associated with high levels of DSLAM functionality and small wire centers are associated with lower levels of DSLAM functionality. For wire centers with 20,000 or more lines, **Begin Proprietary** * **End Proprietary** of the lines are associated with the presence of a DSLAM or a DLC with DSLAM functionality. This percentage decreases as the number of lines served by the wire center declines. For wire centers serving less than 5,000 lines, only **Begin Proprietary** **End Proprietary** of the lines are associated with the presence of a DSLAM or a DLC with DSLAM functionality. This decline is directly related to the percentage of lines that are served by DLCs that do not have DSLAM functionality. For wire centers serving greater than 20,000 lines, the percentage of lines served by DLCs that do not have DSLAM functionality is **Begin Proprietary** * **End Proprietary** for wire centers serving less than 5,000 lines.

Q: What is the relative availability of broadband functionality among Verizon's urban and rural wire centers?

A: In general, broadband availability is higher in urban wire centers compared to rural wire centers. To illustrate this phenomenon, I constructed three maps of Verizon wire centers. The first map, Exhibit 5, depicts the percentage of lines in

each wire center that have access to a DSLAM or a DLC with DSLAM functionality. I have defined these lines as broadband available lines. The map color codes the wire centers into eight groups. The lowest group has 0.0 to 13.98 percent availability, while the highest group has 82.7 to 100 percent availability. The wire centers serving **Begin Proprietary** * **End Proprietary** are in the highest group, the wire center serving **Begin Proprietary** * **End Proprietary** is in the second highest group and the wire center serving **Begin Proprietary** * **End Proprietary** is the third highest group. The second map, Exhibit 6, depicts the percentage of lines served by DLCs that do not have DSLAM functionality. This map also color codes the wire centers into eight groups. The urban areas tend to appear in the groups with relative low percentages. For example, the wire center serving **Begin Proprietary** * **End Proprietary** is in the lowest group.

The third map, Exhibit 7, shows the lines in wire centers that do not have DSLAMs. None of the urban wire centers are included in this group of wire centers.[14]

Q: Does the existence of a DSLAM at a wire center guarantee that there is sufficient capacity to meet the demand for broadband service?

A: No. It is necessary to compare the capacity of the DSLAM to the demand for broadband service. The average capacity of the installed Verizon DSLAMs is equal to approximately **Begin Proprietary** * **End Proprietary** of the

[14] The map only highlights 21 wire centers, even though there are 27 wire centers without DSLAMs. The reason for this omission is that the exchange naming convention used in the reply to OPA data request no. 1.4 appears to be different from the exchange naming convention used in the reply to OPA data request no. 1.1.

lines that served without DLCs. This capacity measure varies from **Begin Proprietary** **End Proprietary** in the larger wire centers. The very high percentage in the small wire centers reflects the fact that the minimum size DSLAM that Verizon installs is large compared to the needs of the small wire centers.

Q: Have you been able to determine if there is adequate DSLAM capacity at every wire center?

A: No. Verizon was not able to provide the demand for DSLAM capacity at the wire center level.[15] Thus, I cannot determine whether the capacity at any wire center is near exhaust.

Q: Were you able to develop any indicators that might be used to determine whether Verizon's capacity is adequate?

A: Yes. I calculated the ratio of the number of ADSL lines to the number of working lines for 47 states and the District of Columbia.[16]The average ratio for the reporting states is 6.3 percent. The range for the ratio is from 11.1 percent to 1.9 percent. Maine is the 47th lowest out of the 48 entities compared, with a ratio of 3.7 percent. Verizon also provided the total number of lines in Maine with Verizon DSL transport service. This number equals approximately **Begin Proprietary** **End Proprietary** of the switched lines not connected to

[15] Verizon's replies to OPA Data Request Nos. 1-2 and 1-3. Verizon indicated that it does not tract DSL customers by wire center.

[16] The source for the number of working lines is the Universal Service Administration Company's 1st quarter filing, table HC-05, and the source for the number of ADSL lines is the FCC's report, High-Speed Services for Internet Access: Status as of June 30, 1994, Industry Analysis and Technology Division, www.fcc.gov/web/stats.

DLCs in wire centers where a DSLAM has been installed.[17] Given that Verizon Maine's average capacity ratio is **Begin Proprietary End Proprietary** the national average ratio of state ADSL lines to total incumbent carrier access lines and **Begin Proprietary than End Proprietary** the current demand for Verizon service, it appears that on average Verizon has sufficient capacity. However, this average could be concealing inadequacies at specific wire centers. At this time, however, it is not possible to determine whether there exists an inadequacy at any wire center.

Q: Please summarize the information received from the Telephone Association of Maine (TAM) filed on behalf of the independent telephone companies.

A: The TAM response listed 142 wire centers. DSLAMs are present at 104 of these wire centers. Ninety-one percent of the independent carrier switched access lines are served out of the 104 wire centers with DSLAMs. However, the TAM response did not reply to OPA Data Request 1-5 regarding DLC functionality and lines served from those DLCs. Failure to reply to that data request means that it is impossible to determine number of lines to which DSL service is available or not available. Therefore, it is impossible at this time to evaluate the Commission's "straw man" proposal, or any other proposal regarding the reasonableness of requiring line sharing for the independent telephone carriers. If the Commission desires to investigate the reasonableness of its proposal or other proposals, it is necessary, at a minimum, to require the independent telephone carriers to reply to OPA Data Request No. 1-5 so that the Commission and the parties to this

[17] This percentage was calculated using the information contained in Verizon's replies OPA Data Request Nos. 1-1, 1-2, and 1-3.

proceeding will know the basic facts about the availability of DSL in the independent telephone carriers' study areas.

V. THE COMMISSION'S "STRAW MAN" PROPOSAL

Q: Please describe the Commission's "Straw Man" Proposal.

A: The "Straw Man" proposal contains three parts. First, it requires both Verizon and the ITCs (subject to any federal preemption limitations) to unbundle the high frequency portion of the loop. This requirement is for all lines that are within 18,000 feet of a wire center or of the remote terminal portion of a DLC, where DSL service is not available for that line. Second, neither Verizon or an ITC would be required to provide the unbundled line-sharing service where it provides DSL service. Third, as Verizon and the ITCs expand their DSL coverage, the area where the line-sharing service is mandated would diminish. However, all existing line-sharing arrangements would be grandfathered.

Q: Do you have reservations regarding the adoption of the "Straw-Man" Proposal?

A: Yes. My reservations center on the limitations placed on the line-sharing arrangement. These limitations include the exclusion from the line-sharing obligation for those portions of the ILEC service territories where the ILEC currently offers DSL service, and the exclusion from the line-sharing obligation for those portions of the ILEC service territories where the ILEC will offer DSL service in the future.

Q: What are your concerns regarding the exclusion of lines where DSL service is currently available?

A: First, it would immediately reduce the level of competition for **Begin Proprietary** * **End Proprietary** of Verizon's lines. This reduction in competitive pressure could have a negative impact on the rate of price reduction for DSL service, slow down the deployment of improvements to the DSL service, and degrade the quality of service received by Verizon DSL customers. Second, reducing the market in which competitors can operate may increase the competitors' average cost of operation, reducing their profits and dampening their determination to actively participate in the market. For example, reducing the size of the competitors' market by not offering line sharing where the incumbent offers DSL may prevent the competitors from reaching the minimum efficient scale to operate successfully. This minimum efficient scale may be a function of the minimum equipment sizes that can be purchased. Alternatively the competitors may suffer from the lack of economies in advertising because their advertising efforts cannot be limited to only the share of the market where they can operate. That is, if a competitor operates in a particular market, its newspaper, radio and television advertising will reach the entire market, rather than just the portion of the market where line sharing is available. The fact that some consumers will not be able to obtain the service may lead to confusion among all consumers and discourage consumers from purchasing from competitors.

Q: What are you concerns regarding the exclusion of lines where DSL service may become available in the future?

A: In areas where DSL is not yet available the "Straw-Man" proposal requires the incumbent to make line sharing arrangements available to competitors. However, if

on a later date the incumbent upgrades its facilities to provide DSL service, the competitor can no longer add customers. The ability to freeze its competitors market by upgrading its facilities provides the incumbent with the incentive to wait, watch and pounce on markets where the competitor is active. Once the incumbent upgrades, the competitor is penalized for identifying the unserved need. If the incumbent acts before the competitor has been able to develop a customer base sufficient to recover its investment, the competitor could lose significant portions of its capital. Therefore, allowing the incumbent to freeze the competitor's market increases the competitor's risk, and discourages competitive entry.

Q: Do you have any concerns regarding the ability of competitors to offer service in the portions of the market where they will be able to purchase line-sharing arrangements?

A: Yes. In the Verizon service territory, the portion of the market open to line sharing according to the "Straw-Man" proposal consists almost exclusively of lines served through DLCs. That is, there are **Begin Proprietary End Proprietary** without the availability of DSL service in areas served by DLCs, while there are only **Begin Proprietary End Proprietary** without availability of DSL service in areas served directly from the wire center. To reach the lines served by DLCs, a competitor must either build his own feeder system, lease legacy copper facilities or dark fiber. It is very risky for the competitor to build a feeder system, especially if, after the competitor's feeder is in place, the incumbent upgrades its DLC to offer DSL and is no longer required to offer line sharing in the distribution sub-loop. With regard to legacy copper and dark fiber,

the Commission currently has dockets open regarding whether these facilities will be made available to competitors as UNEs.[18] If the final disposition of those proceedings is that the facilities will not be available as UNEs, then line sharing opportunities will be severely restricted.

There is an additional restriction for carriers that have signed the VISTA service agreement. This agreement allows competitors to provide xDSL service over the HFPL. However, the Loop used to provide the service "must consist of an entirely copper loop between the Customer premises and the main distribution frame in the serving central office.---The Service does not include the capability to provide xDSL service to Customers served by digital loop carrier systems."[19] Thus, the agreement appears to restrict competition because, for any competitor who has signed the VISTA agreement, that competitor cannot serve the **Begin Proprietary** * **End Proprietary** that Verizon lines served by DLCs. Also for VISTA agreement signers the final outcome of other Dockets would no longer be meaningful because those signers are prohibited from serving customers that would have been connected to the signers' equipment through the use of dark fiber or legacy copper facilities.

Q: What changes do you recommend to the Commission's "Straw Man" Proposal?

[18] Verizon-Maine, Proposed Tariff to Introduce the Rules, Regulations and Related Terms and Conditions Pertaining to the Ordering and Provisions of Dark Fiber as an Unbundled Network Element, Maine Docket No. 2002-243; and Public Utilities Commission, Investigation of Skowhegan Online, Inc., Proposal for UNE Loops, Maine Docket No. 2002-704.

[19] Verizon's reply to OPA Data Request NO. 1-11, attachment VZ 11-GWI vista.doc, attachment 1, paragraph 1.

A: At a minimum, I would recommend that the Commission require the incumbent carriers offer the line-sharing UNE in all areas where DSL is not currently available for an extended period of time, such as six years. Further, the decision to release the incumbent carriers from this responsibility should only be made following another investigation into the reasonableness of providing the service. These changes in the "Straw Man" proposal would reduce the competitors' risk associated with providing DSL service and would encourage the entry of competitors into the market. Next, I recommend that the Commission require the incumbent carriers to offer line sharing in areas where DSL service is currently being offered. This change will encourage competition among the DSL providers with regard to price and quality of service. Finally I recommend that the Commission ensure that any provider that has signed the VISTA agreement will also have the opportunity to purchase the line-sharing UNE, especially with regard to providing service to customers served by digital loop carrier systems. Without this assurance, large numbers of Maine consumers will not be able to purchase DSL service from competitive providers.

V. CONCLUSIONS AND RECOMMENDATIONS

Q: Please summarize your conclusions and recommendations in this case.

A: I recommend that the Commission adopt the following guidelines and principles in this proceeding:

- At a minimum, the Commission should require incumbent telephone carriers to offer a line-sharing UNE wherever the carrier is not providing DSL service.

- A decision to release the incumbent telephone carriers from the obligation to provide the line-sharing UNE should be made only after a subsequent proceeding, provided that the record shows that the availability, quality and price of DSL service would not suffer as a result of releasing carriers from such obligations. Carriers should be not released from these obligations simply because they extended their DSL service to areas previously unserved.
- The Commission should require that incumbent telephone carriers offer a line-sharing UNE even in those parts of their service territory where they are currently offering DSL service.
- The Commission should ensure that competitive carriers that have signed the VISTA agreement will be allowed to use the line-sharing UNE to serve customers that are being served by DLC systems. The Commission should also ensure that the VISTA agreement does not restrict potential DLS providers from taking advantage of alternative lawful arrangements incorporating access to Verizon network in the provision of DSL service.

Q: Does this conclude your testimony?

A: Yes.