COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Investigation by the Department of Telecommunications and Energy on its own Motion into the Appropriate Pricing, based upon Total Element Long-Run Incremental Costs, for Unbundled Network Elements and Combinations of Unbundled Network Elements, and the Appropriate Avoided Cost Discount for Verizon New England, Inc. d/b/a Verizon Massachusetts' Resale Services in the Commonwealth of Massachusetts	D.T.E. 01-20

REBUTTAL TESTIMONY OF JOHN C. DONOVAN

ON BEHALF OF AT&T AND WORLDCOM

July 18, 2001

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I. INTRODUCTION.

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.

A. My name is John C. Donovan and my business address is 11 Osborne Road, Garden City, New York 11530. I am the President of Telecom Visions, Inc., currently providing telecommunications consulting services to AT&T and WorldCom concerning outside plant infrastructure design and construction, as well as costing aspects of the local loop. I also provide services to a number of other companies.

Q. ARE YOU THE SAME JOHN C. DONOVAN WHO PRESENTED DIRECT TESTIMONY IN THIS CASE?

A. Yes. My qualifications were listed in my *Direct Testimony* in this case, and my Curriculum Vitae was included as Exhibit JCD-1 to that testimony.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to critique and provide rebuttal testimony regarding Verizon's cost study and direct testimony presented to the Department of Telecommunications and Energy ("the Department" or "D.T.E."). I also provide support regarding technical outside plant engineering and construction portions of testimony by other AT&T and WorldCom witnesses, and seek to inform the Department about generally accepted outside plant engineering, planning, design, and construction practices in the industry.

Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. Following this introductory section, my testimony is organized in the following fashion:

Section II. Summary of Testimony
Section III. Fill Factors Discussion
Section IV. Use of Engineer, Furnish & Install Factors
Section V. xDSL over Fiber-Fed Digital Loop Carrier Systems
Section VI. Loop Qualification Charges
Section VII. Loop Conditioning Charges
Section VIII. House & Riser Cable
Section IX. Dark Fiber

II. SUMMARY OF REBUTTAL TESTIMONY.

Q. PLEASE SUMMARIZE YOUR REBUTTAL TESTIMONY.

A. Verizon's cost study includes many items that drive costs far beyond reasonable values. I have been directed by AT&T and WorldCom to focus on several of the most important problems in Verizon's cost study, rather that a detailed critique of every single item potentially at issue. My rebuttal testimony focuses on the following points:

?? Verizon's fill factors are far too low. By using the very same distribution cable fill factors criticized by the FCC in Verizon-MA's 271 proceeding, Verizon's costs will fund copper cable that will never be used. I fully support the rebuttal testimony of Mr. Michael R. Baranowski, who recommends Verizon's study, if used

at all, be redone with a 64.1% fill factor. In addition, I recommend a copper feeder cable fill factor of 80%, rather than Verizon's use of an embedded 55.2%, which has suffered from stranded capacity due to technological obsolescence. Fiber fill should be at 100% with an allowance for doubling the number of fibers per Remote Terminal site for full redundancy. Digital Loop Carrier channel card fill should be at 90%, which is very conservative, given that the standard industry practice calls for installing only 6 month's worth of extra line cards, not the 7 year's worth that Verizon's 80% fill represents.

?? Verizon's use of EF&I factors for installing factory assembled Digital Loop Carrier Equipment should be rejected or adjusted to resemble reasonable numbers of labor hours, rather than a cost so large that it represents weeks of installation for tasks that take a couple of days.

?? Verizon's loop qualification rates should be rejected as non-forward-looking. CLECs should only be charged a database DIP charge, and if Verizon's databases are faulty, then Verizon should incur the costs for performing a timely manual loop qualification, and should be ordered to get its databases in order.

?? The Department should stick with its prior ruling that CLECs should not be charged for loop conditioning. Verizon's tactic of salting some copper feeder cable into its outside plant still does not

formulate grounds for load coils and excessive bridged taps. They have still been cared for in Verizon's proposed recurring charges, and no additional CLEC loop conditioning charges are warranted.

?? The Department should stick with its prior ruling on CLEC direct access to House and Riser Cable without cumbersome extra equipment and troublesome extra cross connections. In addition, Verizon's costs should be rejected because labor content for placing building terminals is unacceptably high. The Department should use productivity rates for such construction tasks approved by the FCC.

?? The Department should address the issue of over-recovery regarding dark fiber costs. Verizon has proposed fill factors that fund spare fibers via recurring costs, and then proposes to charge CLECs extra to use those very same fibers, and their associated structure costs. Although not perfect TELRIC methodology, I believe uniform use of 100% fill factors on fiber plant will allow the Department to more closely approximate a fair and appropriate recurring cost for dark fiber.

III. VERIZON'S FILL FACTORS ARE TOO LOW.

Q. WHAT OUTSIDE PLANT FILL FACTORS HAVE VERIZON PROPOSED IN THIS PROCEEDING?

A. Despite the FCC's admonitions in its 271 Order granting Verizon-Massachusetts in-region long distance service,[1] Verizon continues to advocate extremely low fill factors of 40 percent for copper distribution cable,[2] 55.2 percent for copper feeder cable,[3] 60 percent for fiber cable,[4] and 80 percent for Digital Loop Carrier Remote Terminal ("DLC RT") plug-in cards.[5] As cited in my *Direct Testimony*, the FCC said:

> We question whether the low fill factor used in Massachusetts is appropriate without a state-specific justification. We note, however, that the Massachusetts Department is reviewing this input as part of its current rate case.[6]

In a separate statement, Commissioner Ness added:

> I am also troubled by the cost inputs used to set the loop rates in Massachusetts. In particular, the fill factor used is exceptionally low. I have every confidence that the Massachusetts DTE will address any flaws in the inputs through its pending cost proceeding.[7]

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1 Massachusetts Section 271 Memorandum Opinion and Order, No. FCC 01-130, adopted and released April 16, 2001, para. 39.

2 Verizon Panel Testimony at 82.

3 *Ibid*. at 87.

4 *Ibid*. at 87.

5 *Ibid*. at 89.

6 Massachusetts Section 271 Memorandum Opinion and Order, No. FCC 01-130, adopted and released April 16, 2001, para. 39.

7 *Ibid*., *Separate Statement of Commissioner Susan Ness*.

Q. WHAT IS THE RESULT OF USING FILL FACTORS THAT ARE TOO LOW?

A. The result of using fill factors that are too low is an assumption that excessive, unused facilities will be constructed. Such waste simply inflates the cost per used facility. Interestingly, Verizon does not disagree, because in testimony it states,

> Too large an addition [in loop plant] will mean that utilization will be unnecessarily low over the facility's life cycle. [8]

Verizon is preaching against placing excessive facilities that will never be used. However the low fill factors proposed by Verizon in this proceeding do exactly that. As demonstrated in my *Direct Testimony*,[9] Verizon's low fill factors are based on the assumption of large facility additions that will never be used during the facility's life cycle. Even if one were to assume a very high 3% 2nd Line growth rate, using Verizon's excessively low fill factor of 40% would result in outside plant distribution cable that would still not be fully utilized within 31 years,[10] even though the approved service life for such cable is only 22 years. I support the analysis presented in Mr. Michael R. Baranowski's rebuttal testimony of **64.1%** for copper distribution cable.

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[8] Verizon Panel Testimony at 25.

[9] Donovan Direct Testimony at 20:
Utilization Sufficient to Serve all Demand Until Mid-point of Service Life of Cable:
At 3% Growth = $1 \div (1.03)^{11}$ = 72.2% Initial Utilization
Utilization Sufficient to Serve all Demand for Service Life of Cable:
At 3% Growth = $1 \div (1.03)^{22}$ = 52.2% Initial Utilization

[10] Solving for 'n' (number of years): $1 \div (1.03)^{n=31\ yrs}$ = 40% Initial Utilization

Q. IS THERE A RISK THAT BY BUILDING EXCESSIVE FACILITIES, TECHNOLOGICAL ADVANCEMENTS MAY STRAND SUCH INVESTMENTS?

A. Yes. Although telecommunications facilities are engineered and constructed within the requirements established by standards-setting bodies, and normally have reasonably long life cycles, extremely low fill factors risk obsolescence if spare capacity goes unused for decades, as Verizon proposes. Interestingly, Verizon recognizes that risk, yet fails to heed its own admonition when it comes to fill factors. In testimony Verizon states,

> In many instances, it becomes economic to install additional network capacity with the latest technology and thus to leave unutilized a portion of the facilities based on the older technology.[11]

Verizon is saying that at some point in time, the progress of technology may leave stranded investment. However, Verizon's proposed low fill factors in this proceeding simply invite the creation of excess facilities that will end up being technologically obsolete long before they are ever used – if they are ever used at all.

This issue of stranded spare copper pairs is especially important in a critique of Verizon's proposed 55.2% copper feeder cable fill factor. Verizon provides absolutely no valid justification for such a low fill factor, other than reliance on embedded base copper feeder cable fills.

> For copper feeder cables, a 55.2 percent utilization rate was used.

[11] Verizon Panel Testimony at 27.

> [The copper feeder cable] utilization factors used in Verizon MA's cost studies, which are based on an examination of actual fill levels, represent a true and stable picture of the overall forward-looking network fill.[12]

There is no additional Verizon justification placed into evidence. Verizon's embedded base copper feeder cable utilization should be no benchmark. Technological obsolescence is but one reason Verizon is experiencing unacceptably low copper feeder cable fills. Verizon's deployment of fiber fed DLC systems has stranded copper feeder cable. Verizon's own testimony tells the story of how the deployment of fiber-fed DLC systems has resulted in unusually low copper feeder fills near the central office.

> Optical DLC is usually installed first in feeders serving distribution areas that are more distant from the wire center, since it is in such areas that optical DLC provides the greatest efficiencies. The copper feeder cable that is made spare (i.e., freed up) by the DLC installation is then cut and used to provide capacity to distribution areas closer to the wire center. Over time a greater and greater portion of the feeder will be moved to optical facilities.[13]

Verizon has already suffered stranded copper feeder investment as a result of placing fiber-fed (Optical) DLC. Verizon admits that "Over time a greater and greater portion of the feeder will be moved to optical facilities," thereby stranding even more copper feeder pairs over the 22-year service life of the copper cable. Verizon's position of a 55.2% copper feeder fill factor is unsupportable given the evidence at hand.

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12 *Ibid.* at 88.

13 *Ibid.* at 79.

Q. HOW DO VERIZON'S PROPOSED COST STUDY FILL FACTORS WASTE INVESTMENT?

A. As expressed in my *Direct Testimony*,[14] Verizon's fill factors for copper distribution cable assume more spare capacity than could ever be used during the facility's life cycle by more than 8 years (140% of approved service life).

Verizon's fill factor for copper feeder cable is equally flawed. For copper feeder cable, generally accepted outside plant engineering practice calls for building sufficient spare pairs to allow reinforcing (adding new copper feeder cable facilities) every 3 to 5 years. At 3 percent growth per year, this would equate to allowing a 3 to 5 year growth margin of 9% to 15%, which is in severe conflict with Verizon's claim that the *average* utilization on copper feeder cables should be 55.2%. An appropriate fill factor in today's environment should be **80%**. Such a fill factor leaves sufficient spare capacity to handle 3 to 5 years worth of growth and churn for a technology that Verizon has earmarked for replacement with fiber.

The capacity of in-place fiber *feeder* cable continues to be expanded using wave division multiplexing such as different colored lasers over a single fiber. Verizon's use of low fiber fill factors generates cable investment with far more optical fibers than will be necessary to meet the service needs addressed in this proceeding. In order to understand how low Verizon's fill factors actually are, it is important to remember that a 100% fill factor in Verizon's terminology still

[14] Donovan Direct Testimony at 20.

allows one extra transmit fiber and one extra receive fiber for every transmit and receive fiber run to fiber optic multiplexers. Thus the 60% fill factor (i.e., 40% spare capacity) is on top of the extra fibers already costed.

But it is even worse than that. Verizon seeks double recovery not only by using a very low 60% fill factor on Loop UNE fiber strands, which increases the cost per strand to 167% of a strand's actual cost (1 ÷ 0.60), in addition it then seeks to sell the paid-for 40% spare as Dark Fiber which it increases improperly yet again to 167% of cost by using the 60% fill factor yet again (please see my later discussion of Dark Fiber UNEs). An appropriate fill factor for fiber cable should be **100%** for both Loop UNEs and Dark Fiber.

Regarding DLC channel unit plug-in utilization, a purpose of fill factors is to buy time to install new facilities at the time existing facilities near exhaust. Verizon proposes plugging-in 20% of extra channel unit cards (by using an 80% plug-in fill factor). If one were to assume a high 3% growth in second lines, there is no justification in having almost 7 years of idle spare plug-in cards sitting in DLC RT shelves[15]. Even Verizon admits:

> Unlike other components of the loop plant, which can take a number of months to design, order, and install, the installation interval for plug-ins is shorter. [I]f Verizon MA runs out of a particular type of plug-in needed to meet a service order, at a particular RT location, then a technician must be dispatched to install each plug-in.[16]

[15] Given rapid advances in electronic chip technologies, these extra cards will probably be obsolete long before they are ever used.

[16] *Ibid.* at 89.

Verizon has demonstrated no need for installing so many unused plug-ins simply to avoid a 20-minute dispatch and 5 minutes to stick a card in a slot at a DLC RT cabinet.[17] The generally accepted standard in the industry is to install enough plug-ins for existing service plus 6 months growth (1½% spare at 3% per year growth). I believe that **90% fill** for plug-ins is more than adequate.

Q. PLEASE SUMMARIZE YOUR POSITION ON FILL FACTORS.

A. In addition to the testimony above, I have also worked closely with, and fully support the testimony of Mr. Michael R. Baranowski regarding the fill factor issue. Please refer to his testimony for additional information in this area.

Verizon's position on fill factors suffers the following major weaknesses: 1) inefficient amounts of spare capacity; 2) the risk that portions of the facility will never be used over the facility's life cycle; 3) the likelihood that the facility will become technologically obsolete before it is ever used; and, 4) forcing today's ratepayers and CLECs to pay for facilities that Verizon will use to generate windfall profits and obtain double recovery in the future. The Department should reject Verizon's fill factors. I recommend that the Department adopt the following fill factors:

- Copper Distribution Cable at 64.1%
- Copper Feeder Cable at 80%
- Fiber Feeder Cable at 100% with full redundancy (i.e., 4 fibers per DLC site yields an effective fill of 50%)

[17] For example, Verizon advocates installing over 400 lines of extra capacity, i.e., 100 extra 4-line plug-in cards, in a typical 2016-line DLC Remote Terminal cabinet.

?? DLC Channel Unit Plug-Ins at 90%.

Should the Department decide to utilize Verizon's cost study approach, then I confidently support the 64.1% overall distribution copper fill factor presented in the rebuttal testimony of Mr. Michael R. Baranowski.

For copper cable, I recommend that the Department pay heed to comments made by the FCC in its Section 271 Memorandum and Order of April 16, 2001 (at para. 39):

> The Commission noted that it [the FCC] adopted fill factors ranging from 50 to 75 percent for the USF cost model, that the Kansas Commission adopted a 53 percent distribution cable fill factor, and that the New York Commission adopted a 50 percent distribution cable fill factor.

I recommend that the Department consider a fiber fill factor of 100% with full redundancy of 4 fibers per DLC site (i.e., an effective fiber fill factor of 50%), and that because of the ability to rapidly dispatch plug-in cards to DLC RTs, that a fill factor of 90% be deemed to be more than adequate.

IV. VERIZON'S USE OF EF&I FACTORS FOR INSTALLING FACTORY ASSEMBLED DIGITAL LOOP CARRIER EQUIPMENT IS INAPPROPRIATE AND FAR TOO HIGH.

Q. HOW HAS VERIZON DETERMINED THE INSTALLED COST OF DLC SYSTEMS?

A. Verizon claims that it used material costs for DLC equipment from its vendors, and then computed installed costs using embedded base Engineer, Furnish and

Install ("EF&I") factors.[18] I explained this issue in my *Direct Testimony*, and indicated why it is inappropriate to base the cost of factory-preassembled units on such a method.[19] Verizon has deviated from TELRIC principles by using embedded base numbers, has used numbers that span far more than DLC equipment, and has created costs for installing DLC equipment that is far beyond anything remotely reasonable. As stated in its Panel Testimony (at 30), Verizon added up all of its embedded base Detailed Continuing Property Record ("DCPR") hardwire plus DCPR plug-in labor costs, and then divided by the total DCPR material components in its embedded base, to calculate an EF&I factor. This method spans far too broad a spectrum of equipment, and when examined in detail results in absurdly long installation times for prepackaged DLC equipment.

[18] Verizon Panel Testimony at pages 31 to 32.

[19] "Many large telephone companies have relied in the past on simplistic engineering and installation percentage factors that are applied to equipment investment. Use of such factors can be very misleading. For example, good competitive procurement policies may determine that it is much more efficient to pay a bit more to have equipment pre-assembled in the factory by a manufacturer, rather than having that equipment installed piece by piece in the field. In such a case, use of an engineering and installation factor as a percent of equipment costs will double count appropriate investments. Pre-assembled equipment is engineered up front, and installation labor in the field is significantly reduced. The installation factor method would make pre-assembled equipment more expensive to engineer and install under such a construct. It is therefore appropriate to base costs on disaggregated material costs, plus an estimate of engineering hours and an estimate of installation hours." [Donovan Direct Testimony at 38-39]

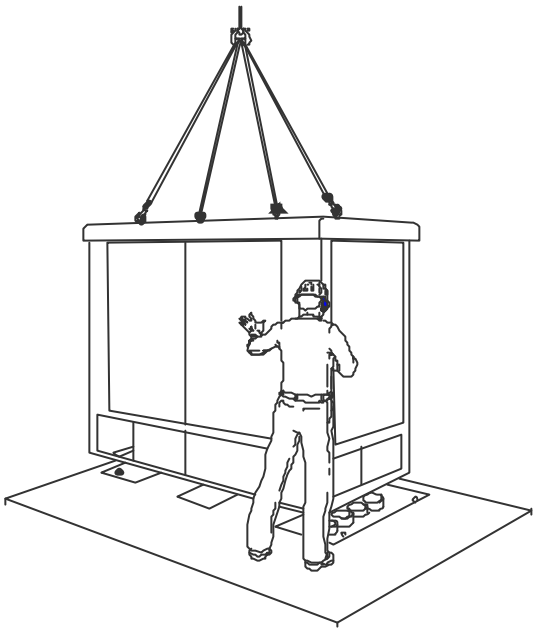
Q. HOW DO VERIZON'S PROPOSED INSTALLATION COSTS FOR PREPACKAGED DLC SYSTEMS TRANSLATE INTO EQUIVALENT HOURS TO INSTALL SUCH EQUIPMENT?

A. An examination of Verizon's proposed EF&I dollar costs translate into the following installation times, if one uses what the FCC found to be a typical fully loaded construction labor rate of $60 per hour.[20]

Verizon			Reasonable EF&I hours proposed by AT&T / WorldCom
DLC Cabinet Size	Material Cost	Equivalent EF&I Hours	
192 Line	$11,148	114 hrs. (14 tech-days)	27 hrs. (3.50 tech-days)
672 Line	$28,302	333 hrs. (42 tech-days)	46 hrs. (5.75 tech-days)
1344 Line	$34,269	391 hrs. (49 tech-days)	50 hrs. (6.25 tech-days)

It does not take **weeks** to install a DLC cabinet, as the equivalent EF&I hours would indicate in the table above. Verizon's own vendor's documentation indicates the following:

[20] FCC FNPRM 99-120, 5-28-99, para. 138 states, "We also propose a $60.00 per hour labor rate for splicing, which is within the range of filings on the record. [FCC footnote 252: The $60.00 per hour rate is the prevalent labor rate for mechanical apprentices.]"



"The Litespan ... cabinet is a fully self-contained remote terminal (RT)." "It is completely assembled and tested at the factory. Once the equipment is on site and bolted to its mounting pad, the only assembly required consists of connecting local power, connecting drop facilities, connecting optical fiber facilities, installing the back-up batteries, and plugging the circuit packs into their assigned locations in the racks."[21]

Q. DOES VERIZON MAKE ANY STATEMENT THAT SUPPORTS THE POINTS YOU MAKE HERE, AND IN YOUR DIRECT TESTIMONY, THAT EF&I COSTS SHOULD BE BASED ON THE HOURS IT TAKES TO DO THE FUNCTION, NOT ON A PERCENTAGE OF MATERIAL INVESTMENT?

A. Yes. Verizon makes the following statement:

> [T]he amount of time required to engineer or install the equipment would not change simply because the price of the equipment is reduced.[22]

This is precisely the point that I have made here and in my *Direct Testimony*. If a company chooses to pay a vendor more to prepackage electronics at the factory, to make it more efficient to install the equipment in the field, then EF&I costs

[21] Alcatel Litespan DLC documentation. See Donovan Direct Testimony at 52.

should go down. Verizon's EF&I method would make costs under such a scenario go up, which is counterintuitive, and simply incorrect. Verizon has the wherewithal to produce an estimate of hours required to Engineer, Furnish and Install DLC equipment. It has done so via ECRIS (Verizon's Engineering Construction Record Information System program) for other outside plant input values, but has neglected to do so for DLC systems. Verizon would have the Department believe that its absurdly high installation hours are logical and justified, which they are not. I recommend the Department accept the engineering and installation hours that I have proposed above.

V. VERIZON'S FAILURE TO PROVIDE COST-BASED UNE PRICING FOR XDSL OVER FIBER-FED DIGITAL LOOP CARRIER IS ANTICOMPETITIVE, VIOLATES FCC MANDATES, AND DOES NOT FOLLOW TELRIC PRINCIPLES.

Q. HAS VERIZON PROPOSED TELRIC-BASED PRICES FOR DSL CAPABLE LOOPS WITH FIBER-FED DLC SYSTEMS?

A. No.

Q. SHOULD VERIZON BE REQUIRED TO PROVIDE SUCH PRICES?

A. Yes. My conclusion is based on (1) the Department's requirement that Verizon must develop and propose in this docket TELRIC rates for all UNEs and (2) the FCC's requirement that incumbent LECs' obligation to provide loops with DSL capability as a UNE includes the obligation to provide fiber fed DLC loops with

[22] Verizon Panel Testimony at 31.

DSL capability. Thus, Verizon must provide TELRIC prices for such loops in this docket.

Q. WHERE DID THE DEPARTMENT SAY THAT ALL UNE RATES MUST BE DEVELOPED AND PRESENTED IN THIS DOCKET.

A. The Department directed Verizon to develop and file TELRIC-based UNE rates in its order opening this docket. See, *Vote And Order To Open Investigation,* issued on January 12, 2001. Moreover, in a June 12, 2001 interlocutory order in this docket, the Department made clear that this docket is intended to be a comprehensive review of Verizon's rates for network elements and services.

Q. ON WHAT BASIS DO YOU CONCLUDE THAT THE FCC REQUIRES THE LOOP UNE TO INCLUDE DSL FUNCTIONALITY EVEN FOR LOOPS THAT ARE FIBER FED?

A. The FCC, in its January 19, 2001 Line Sharing Order, states:

> We concluded in the [original] *Line Sharing Order* that lack of access to the high frequency portion of the local loop materially diminishes the ability of competitive LECs to provide certain types of advanced services to residential and small business users, delays broad facilities-based market entry, and materially limits the scope and quality of competitor service offerings.[23]

At paragraph 13, the FCC went on to state:

> All indications are that fiber deployment by incumbent LECs is increasing, and that collocation by competitive LECs at remote terminals is likely to be costly, time consuming, and often unavailable. **We provide this clarification because we find that it would be inconsistent with the intent of the *Line Sharing Order* and the statutory goals behind sections 706 and 251 of the 1996 Act to permit the increased deployment of fiber-based networks by incumbent**

[23] FCC 01-26, January 19, 2001, para. 5.

LECs to unduly inhibit the competitive provision of xDSL services[24]

The FCC also noted:

> [The] Percentage of Bell Atlantic-New York assigned loops served using some form of DLC will grow from 14.4 percent at the end of 1999, to 16.4 percent by year-end 2000, and to 18.3 percent by year-end 2001. SBC's three-year Project Pronto initiative, which relies in large part upon increased use of DLC systems to reduce overall costs, entails laying some 12,000 miles of fiber transmission facilities and creating 25,000 neighborhood gateways. … Approximately 25 percent of SBC's customer lines are served by DLC systems today.[25]

Q. DID THE FCC ACTUALLY GO ON TO MANDATE THAT VERIZON PROVIDE TELRIC-BASED UNE PRICING FOR FIBER-FED XDSL LOOPS?

A. Yes. In its January 19, 2001 Reconsideration Order, the FCC made the following statements in support of requiring ILECs to provide TELRIC-based UNE pricing for fiber-fed xDSL loops:

> [In our original *Line Sharing Order*] we expressed our belief that the requirement to unbundle the high frequency spectrum would not infringe incumbents' ability to rearrange or replace their loop plant because the retail xDSL service being offered by the incumbents themselves requires the same loop plant that competitive LECs require to offer shared-line xDSL.[26]

> We concluded [in the original *Line Sharing Order*] that incumbent LECs are required to unbundle the high frequency portion of the local loop even where the

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[24] FCC 01-26, January 19, 2001, para. 13 (emphasis added). See also, footnote 23, citing to Rhythms and Covad comments ("noting assertions by Covad and Rhythms that, in many instances, it may be cost prohibitive to collocate a traditional DSLAM at a remote terminal, there may not be space for requesting carriers to do so, and the means to connect the DSLAM to the unbundled fiber feeder network element may not be commercially viable").

[25] FCC 01-26, January 19, 2001, footnote 22, citing AT&T Comments 48 (Aug. 22, 2000) in *Proceeding on Motion of the Commission to Examine Issues Concerning the Provision of Digital Subscriber Line Services*.

[26] FCC 01-26, January 19, 2001, para 7, citing *Line Sharing Order*, 14 FCC Rcd at 20951, para. 80.

> incumbent LEC's voice customer is served by DLC facilities.[27]

> Rhythms asserts that some incumbent LECs have taken the position in line sharing negotiations that they have no obligation to unbundle fiber portions of the loop when those portions are used to provide xDSL service.[28]

> We clarify that the requirement to provide line sharing applies to the entire loop, even where the incumbent has deployed fiber in the loop (e.g., where the loop is served by a remote terminal). Our use of the word "copper" in section 51.319(h)(1) was not intended to limit an incumbent LEC's obligation to provide competitive LECs with access to the fiber portion of a DLC loop for the provision of line-shared xDSL services. As noted above, incumbent LECs are required to unbundle the high frequency portion of the local loop even where the incumbent LEC's voice customer is served by DLC facilities. The local loop is defined as a transmission facility between a distribution frame (or its equivalent) in an incumbent LEC central office and the loop demarcation point at an end user customer premises, including inside wire owned by the incumbent LEC. By using the word "transmission facility" rather than "copper" or "fiber", we specifically intended to ensure that this definition was technology-neutral. … When we concluded in the *Line Sharing Order* that incumbents must provide unbundled access to the high frequency portion of the loop at the remote terminal as well as the central office, we did not intend to limit competitive LECs' access to fiber feeder subloops for line sharing.[29]

There is even more convincing language in the FCC's January 19, 2001 Reconsideration Order, but the above citations give clear indications as to the intent of the FCC. Verizon is well aware of the FCC's intent and the clarifications of its intent. Yet Verizon still presents the following in its Direct Panel Testimony in this case:

> [I]t simply does not make sense to talk about end-to-end DSL transmission over loops served by DLC systems and equipped with fiber feeders. … [W]hat Verizon MA

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[27] *Ibid.* para. 8.

[28] *Ibid.* para. 9.

[29] *Ibid.* para. 10.

> provides, are copper transmission paths to which the CLECs can attach their own DSL electronics.[30]

Q. IS VERIZON'S REFUSAL TO PROVIDE XDSL OVER FIBER FED DLC SYSTEMS ANTI-COMPETITIVE?

A. Yes. As recognized by the FCC in the quotes above, if an ILEC is able to avoid supplying CLECs with xDSL services over a fiber-fed DLC feeder network, at the same time that it is rapidly replacing all of its copper feeder with fiber-fed DLC systems, then ILECs will succeed in closing down xDSL CLECs.

First, regarding the replacement of copper feeder with fiber/DLC feeder, consider that Verizon continues to follow its corporate all fiber feeder strategy. Also consider Verizon's statement that,

> xDSL is, therefore, an interim technology – one that will eventually be displaced by fiber-based transmission technologies. It is, moreover, a technology that is based on and largely justified by the use of embedded plant. Verizon MA is not deploying copper loops on a forward-looking basis exclusively to support xDSL transmission technologies or the advanced digital services that those technologies can support. [Verizon footnote 20: … the use of xDSL technology is limited to the (copper) distribution portion of the [fiber fed] loop; the technology would not be used on the (fiber) feeder facilities between the terminal and the central office. Thus, even in such applications, the use of the technology would still be limited to copper cables].[31]

As ILECs rapidly roll out fiber fed DLC systems to replace their existing copper feeder plant, they have new incentives to do so. One of those incentives is to kill the xDSL CLEC.

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30 Verizon Panel Testimony at 101.

31 Verizon Panel Testimony at 98.

Q. HAS VERIZON GIVEN ANY REASON FOR NOT DEVELOPING TELRIC BASED PRICES FOR DSL CAPABLE LOOPS WITH FIBER-FED DLC SYSTEMS?

A. It has not stated explicitly its reasons, but it has provided testimony relating to this point that I believe is trying to lay the groundwork for a fallacious argument that Verizon does not have to provide TELRIC based prices for DSL capable loops with fiber-fed DLC systems.

Q. WHAT DO YOU BELIEVE IS AT THE HEART OF VERIZON'S CLAIM THAT IT SHOULD NOT HAVE TO PROVIDE COSTS AND PRICES FOR XDSL OVER FIBER-FED DLC LOOPS?

A. I believe that Verizon's only self-proclaimed argument against being required to provide TELRIC-based xDSL UNE prices over fiber-fed DLC systems is its incorrect premise that xDSL is a **technology**, and not a **service**.[32] Regardless of Verizon's attempted semantic argument – for which I believe Verizon is wrong in any case – Verizon still must provide FCC-mandated TELRIC-based UNE pricing for xDSL over fiber. As I will show below, the FCC calls it a service; in addition, Verizon admits that **at least one xDSL service can be served over fiber**.

Q. WHY IS VERIZON INCORRECT IN ITS CLAIM THAT XDSL DOES NOT REFER TO A SERVICE OR GROUP OF SERVICES?

A. Verizon's attempt at avoiding TELRIC-based UNE pricing for xDSL over fiber-fed DLC systems depends on the incorrect argument:

- ??Given: That xDSL is a technology only provisionable over copper pairs, and
- ?? Given: That fiber-fed DLC systems have at least one part of the circuit that is not over copper pairs, then
- ??Hence: xDSL services cannot exist over a fiber-fed DLC loop, and
- ??Hence: Verizon is not required to provide TELRIC-based UNE pricing for xDSL loops.

Verizon's own testimony reveals that its argument fails in its foundation. If I can prove that at least one xDSL service is routinely provided over fiber-fed DLC technology, then Verizon's argument tumbles like a house of cards.

Verizon states,

> Certain other forms of xDSL technology, such as ISDN Digital Subscriber Line ("IDSL"), ***are*** compatible with loops incorporating fiber-based DLC systems. [Verizon Panel Testimony footnote 19]

In addition, major telephone companies recognize that xDSL over fiber technology exists today. For example, SBC's Project Pronto is on record as providing a means and method for providing xDSL services over fiber-fed DLC systems. Verizon also knows that xDSL services are provisionable over fiber-fed DLC loops – it just wishes to provide them at rates that are not TELRIC-based, rather than providing those services as UNEs. The Department should rule in favor of consumers and competition, that xDSL over fiber-fed loops should be priced as a UNE, not as a tariffed service. Consumers in the Commonwealth of

[32] Verizon Panel Testimony at 93.

Massachusetts do not care whether cables run underground or on telephone poles; consumers do not care about technologies; consumers care about choice and competitive prices for the goods and services they want – in this case, high speed Internet service.

VI. VERIZON'S PROPOSED RATES FOR LOOP QUALIFICATION ARE EXCESSIVE AND ARE BASED ON NEITHER FORWARD LOOKING TECHNOLOGY NOR CURRENT COSTS.

Q. IS VERIZON'S PROPOSED MECHANIZED LOOP QUALIFICATION DATABASE FULLY POPULATED?

A. No. Verizon claims,

> Since the Database is still in the process of being built on a central-office-by-central-office basis, in some cases a loop on which a CLEC wishes to offer an xDSL-based service may not yet be included in the Database.[33]

If the database does not include a loop requested by a CLEC, then Verizon proposes to force the CLEC to pay for a manual loop qualification charge to make up for Verizon's database failures.

Q. IS VERIZON OFFERING A MECHANIZED LOOP QUALIFICATION PROCESS IN A TIMELY FASHION?

A. No. Verizon has indicated that it intends to take up to 5 years to populate its mechanized loop qualification database:

[33] Verizon Panel Testimony at 103.

> The total testing cost is then determined for the five-year period that will be required to qualify all of Verizon MA's loops.[34]

Q. DOES VERIZON'S PROPOSED MECHANIZED LOOP QUALIFICATION DATABASE REPRESENT FORWARD LOOKING TECHNOLOGY?

A. No. Massachusetts consumers have been paying Verizon for years to maintain appropriate information in its OSS databases, and Verizon's own practices for years have called for populating loop makeup information in its LFACS database. A forward-looking technology should include a fully populated and operational database. Yet by Verizon's own admission, Verizon LFACS is insufficiently populated with appropriate information.

Q. IS VERIZON BUILDING A GOOD LOOP QUALIFICATION DATABASE?

A. No. Verizon only plans on having a pseudo-loop-length in its database. This loop length is not an actual loop length, but simply a capacitance measurement supplied by its Mechanized Loop Testing ("MLT") system.

Q. DOES THE MLT TEST SYSTEM PROVIDE AN ACCURATE LOOP LENGTH MEASUREMENT?

A. No, not at all; there are much more accurate methods available using state-of-the-art technology purchased by Verizon, which I will discuss later. No technician would trust a MLT loop length measurement for several reasons. MLT performs

[34] Verizon Panel Testimony at 110.

a roughshod capacitance indication[35] that has a very broad degree of variance. The equipment is not accurate, and the capacitance of the loop can vary significantly. Capacitance of the loop is changed by temperature, cable insulation type, moisture in the cable or on the wires at a terminal, wet terminal face plates, noise on the line, cross battery, cross talk, the number of telephone sets at the end of the loop, including modems, and any other electrical impedance that deviates from the "perfectly clean theoretical circuit". Verizon claims the following:

> A CLEC can submit a query to the Database through Verizon MA's standard Operations support System wholesale interfaces. The query may identify the loop in question by telephone number or address. The principal loop qualification information that is available from the Database and that would be of interest to CLECs is the total metallic loop length (including bridged taps), as determined by an MLT test.[36]

This is an extremely poor method for calculating the loop lengths for the loops in the database. The resulting inaccuracies in the database will contribute to the need for CLECs to incur Verizon's proposed unnecessary, expensive, manual loop qualification.

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[35] Since cable pair capacitance in unaffected by wire gauge, Verizon's proposed method violates the FCC's Remand Order that requires such information, as discussed later in this testimony.

[36] Verizon Panel Testimony at 104-105. In the accompanying footnote 23, Verizon states, " An MLT test determines the effective length of a loop by measuring its capacitance. The process involves sending a voltage pulse from testing equipment located in an MLT test center, through a central office switch port, and down the loop being tested. Only working loops, i.e., loops connected to a switch port and provided with dialtone, can be MLT-tested."

Q. DOES VERIZON'S DATABASE GIVE A FALSE INDICATION THAT MANY LOOPS DO NOT QUALIFY FOR XDSL SERVICES, WHEN IN FACT THEY DO QUALIFY?

A. Yes. Verizon's database will give a "red-light" indication that a loop does not qualify for xDSL services, even though it will qualify if the only negative constraint is a Verizon-imposed 15,000-foot loop-length limit. Current xDSL services operate very effectively on a clean copper loop up to 18,000 feet (and beyond with emerging hardware). Verizon's "red-light" denies at least 3,000-feet worth of customers access to high speed Internet service.

> The Database will also indicate, however, whether the loop is qualified for the offering of DSL service. (A loop is deemed qualified for DSL if the total loop length, including bridged tap, is less than 15,000 feet, if the loop is not served by DLC, and if T1 is absent from the loop's binder group.)[37]

Q. DOES VERIZON'S DATABASE SATISFY FCC REQUIREMENTS?

A. No. Such minimal and inaccurate database information does not satisfy FCC requirements. The FCC addressed this issue at length in it UNE *Remand Order*:

> [T]he incumbent LEC must provide to requesting carriers the following: (1) the composition of the loop material, including, but not limited to, fiber optics, copper; (2) the existence, location and type of any electronic or other equipment on the loop, including but not limited to, digital loop carrier or other remote concentration devices, feeder/distribution interfaces, bridge taps, load coils, pair-gain devices, disturbers in the same or adjacent binder groups; (3) the loop length, including the length and location of each type of transmission media; (4) the wire gauge(s) of the loop; and (5) the electrical parameters of the loop, which may determine the suitability of the loop for various technologies.[38]

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[37] Verizon Panel Testimony at 105.

[38] FCC UNE Remand Order, November 5, 1999, para. 427.

> We also agree with commenters that an incumbent … may not filter or digest such information to provide only that information that is useful in the provision of a particular type of xDSL that the incumbent chooses to offer. For example, SBC provides ADSL service to its customers, which has a general limitation of use for loops less than 18,000 feet. In order to determine whether a particular loop is less than 18,000 feet, SBC has developed a database used by its retail representatives that indicates only whether the loop falls into a "green, yellow, or red" category. Under our nondiscrimination requirement, an incumbent LEC cannot limit access to loop qualification information to such a "green, yellow, or red" indicator. Instead, the incumbent LEC must provide access to the underlying loop qualification information contained in its engineering records, plant records, and other back office systems so that requesting carriers can make their own judgments about whether those loops are suitable for the services the requesting carriers seek to offer. Otherwise, incumbent LECs would be able to discriminate against other xDSL technologies in favor of their own xDSL technology.[39]

Q. ARE THERE ALTERNATIVE APPROACHES THAT WOULD PRODUCE MORE DETAILED AND MORE ACCURATE INFORMATION?

A. Yes. I have included as Exhibit JCD-2 a press release by Teledyne Corporation that announces that

> Verizon Communications has placed a multi-million dollar order for key features of Celerity, a comprehensive ADSL test system solution that pre-qualifies copper wire for broadband services in less time than other methods and at a significantly reduced cost.
>
> Teledyne's Celerity helps automate installation processes and supports Verizon's goal of customer "self installation."
>
> In over 3800 tests Celerity yielded better than 99% accurate load coil detection with no false detections.
>
> The full Celerity test system uses breakthrough, patented techniques to accurately qualify millions of subscriber lines for DSL. Celerity's measurements provide LEC's the capability to **pre-qualify** every line in

[39] *Ibid.*, at para 428.

> the current voice network using current switching infrastructure. This allows the LEC's to meet the quality and cycle time requirements of the market at a significantly reduced cost. [emphasis added]

This press release dated April 24, 2001 flies in the face of Verizon's Panel Testimony (at 107) submitted after the Press Release, stating:

> Obtaining information on cable gauges, load coil locations, etc., for all of Verizon MA's loops – and using it to populate a greatly expanded database – would require a massive and highly expensive effort. Paper records ("cable plats") would have to be reviewed for literally millions of loops. This would greatly expand the cost of the Database for all carriers, including those whose chosen technologies do not require such detailed information.

Based on this press release and the inconsistent position that Verizon is taking in this proceeding, I can only conclude that Verizon is planning to use the more accurate and less expensive database for itself, while using (and charging for) the less accurate more expensive database for its competitor.

Q. WHAT ARE YOUR OVERALL CONCLUSIONS ABOUT VERIZON'S PROPOSED LOOP QUALIFICATION METHODS AND COSTS?

A. I believe that Verizon is attempting to charge CLECs for creating a database of loop characteristics for which ratepayers have already been charged. I believe that Verizon's proposed method of creating that database will result in CLECs suffering a recurring charge for a database that is grossly inadequate and which fails FCC *Remand Order* mandates. I believe that Verizon should be brought to task as to why it has not informed the Department that it is implementing a more efficient system. Lastly, I believe that Verizon's intent is to force CLECs to incur excessive manual loop qualification charges for virtually every loop, or run the

risk of simply hoping that a requested loop will work adequately on the service date, since its "database" is technologically inferior.

Q. ARE VERIZON'S PROPOSED MANUAL LOOP QUALIFICATION CHARGES REASONABLE?

A. No. I believe that Verizon should be required to perform manual loop qualification for CLECs at no premium cost to the CLEC – it should be a simple database DIP charge.

VII. THERE SHOULD BE NO CLEC CHARGE FOR LOOP CONDITIONING.

Q. WHAT DO YOU BELIEVE IS AT THE HEART OF VERIZON'S CLAIM THAT IT SHOULD NOW BE ALLOWED TO CHARGE FOR LOOP CONDITIONING, EVEN THOUGH SUCH RELIEF HAS RECENTLY BEEN DENIED BY THE DEPARTMENT?

A. Verizon now appears to have abandoned its fervent argument in favor of "An All Fiber Feeder Network" because it has discovered that it has more to gain in reaping Non-Recurring Cost rewards previously denied by the Department. Apparently, Verizon believes the Department denied several non-recurring costs solely on the grounds that Verizon's recurring costs were based on a fiber-based, remotely provisionable network built to support all advanced services without a need for loop conditioning.

Verizon's argument to revisit it's recently denied position to charge CLEC's for Loop Conditioning is based on its presumption that the Department's only foundation for denying such charges is that loop UNE rates were based on

recurring charges for an all-fiber-fed loop, which then precluded Verizon from charging extra to condition copper-fed loops. Verizon assumes the following logic:

- Given: Recurring charges for UNE loops based on an all-fiber-feeder-fed loop include costs that preclude load coils and excessive bridged tap, and
- Given: That since no load coils or excessive bridged tap can exist in such a construct,
- Hence: Verizon has not been allowed to charge for the removal of load coils or excessive bridged tap.
- Therefore: If Verizon includes some number of copper-fed loops,
- Hence: Verizon should then be allowed to charge for loop conditioning to remove load coils and excessive bridged tap.

Q. IS VERIZON'S ARGUMENT VALID?

A. No. Even when copper is used in a forward-looking network, that does not mean that loop conditioning is required. Conditioning costs arise from the removal of load coils and excessive bridged taps. No copper loop in a forward-looking network would contain load coils and excessive bridged taps.

As I explained in my *Direct Testimony*[40], the Serving Area Concept employed by Verizon since 1972 eliminated excessive bridged taps for all loops.

> In the early 1970's, the Serving Area Concept ("SAC") design was introduced as a prescription simplified

[40] Donovan Direct Testimony at pages 7 to 8.

> engineering planning and design method, and was the first major attempt to modernize the network to care for growing and ubiquitous service to an ever shifting customer base. Under SAC design, the distribution cable network is connected to the feeder network at a single interconnection point, the Serving Area Interface or Feeder Distribution Interface with no multipled copper feeder cable facilities (i.e., zero bridged tap)[41].

The Carrier Serving Area Concept employed by Verizon since 1980 eliminated all load coils, which are required whenever a loop has in excess of 18,000 feet of copper cable (no load coils are required on regular loops with less than 18,000 feet of copper cable).

> In 1980 the SAC design concept was incorporated into the Carrier Serving Area concept ("CSA").[42]

Q. BASED ON THE RECURRING LOOP DESIGN USED BY VERIZON IN THIS PROCEEDING, SHOULD THERE BE ANY CHANGE IN THE DEPARTMENT'S POSITION ON LOOP CONDITIONING?

A. No. Verizon has presented nothing new. Whether recurring costs for a loop are based on an all fiber-fed network, or whether costs for a loop are based on copper feeder cable for short loops[43] plus fiber-fed DLC for long loops, the outcome is the same. The Department's logic regarding the point that recurring costs proposed by Verizon funds a loop without excessive bridged tap and without any load coils is as valid as ever. Verizon should be denied any additional non-recurring charges to remove loop defects.

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41 Bellcore (now known as Telcordia), *Telecommunications Transmission Engineering*, 1990, page 93.

42 Telcordia, *Telcordia Notes on the Networks*, October 2000, page 12-4.

43 For example, see Verizon response to Discovery Question CC 3-38: "Copper feeder additions are triggered by demand for POTS, special switched and non-switched services within a short distance from the serving central office."

VIII. VERIZON'S PROPOSALS FOR HOUSE AND RISER CABLE ARE AWKWARD, ANTI-COMPETITIVE, AND TOO EXPENSIVE.

Q. DO YOU AGREE WITH VERIZON'S CLAIMS THAT ITS HOUSE AND RISER CABLE DESIGN REFLECTS FORWARD-LOOKING ENGINEERING?

A. No. Verizon's diagram and cost study for House and Riser Cable, as presented in Sections 6.a. and 6.b. of its cost study, reflects a confusing, complex, inefficient design, as already determined by the Department in prior proceedings. Verizon's diagram (please see left half of Figure 1, below) shows both Verizon's facilities A and a CLEC's facilities B terminating in the basement of a building (although keyed letters are used to help describe Verizon's complex design, the better simple design will be explained in a moment).

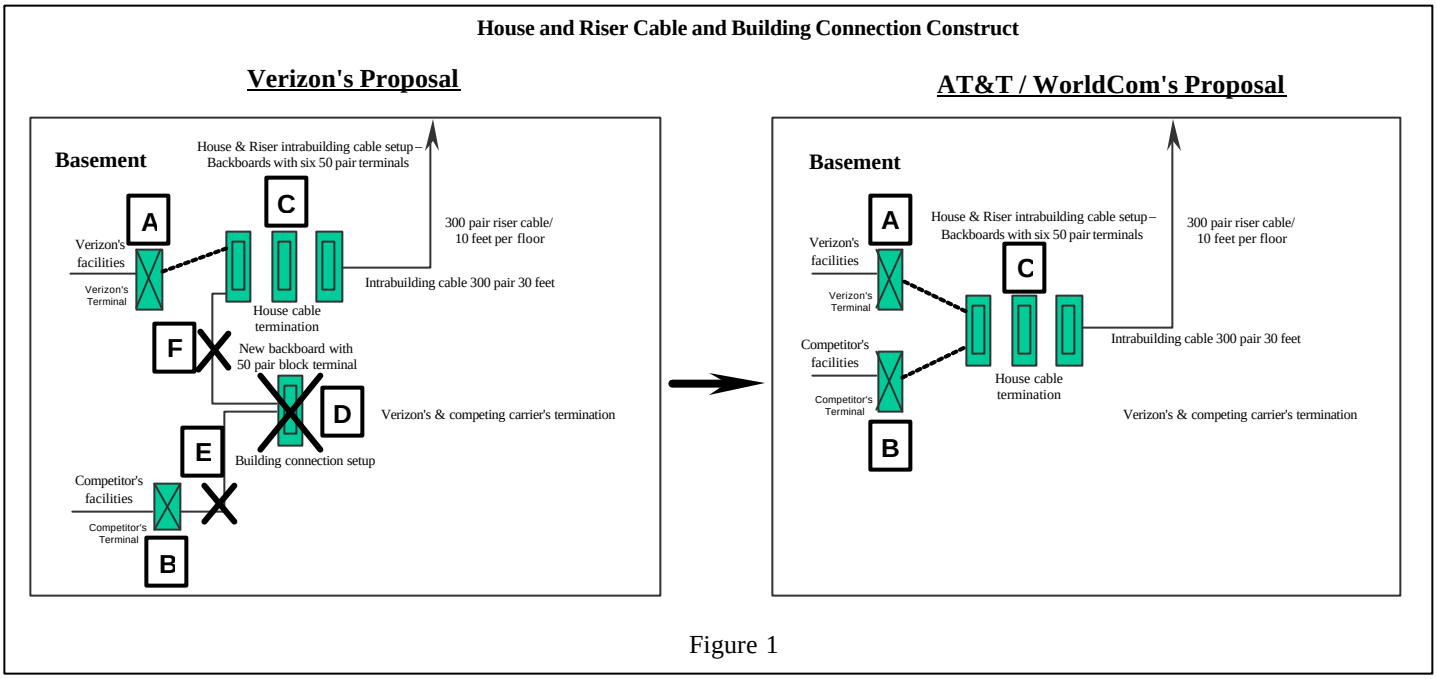


Figure 1

Verizon then attempts to force the CLEC to pay for an extra, intermediate, *"New backboard with 50 pair block terminal"* D an extra connecting cable E, and an extra cross connection wire-pair at D. The extra connecting cable E is terminated on the CLEC entrance facility B, run to the intermediate 50 pair terminal D, and terminated there. Verizon forces the CLEC to make a cross connection at the CLEC entrance terminal B, and forces the CLEC to make a second cross connection at the intermediate 50 pair terminal D. Verizon then terminates yet a third cross connection on the intermediate 50 pair terminal D, runs the cross connection wire to the *"House & Riser intrabuilding cable setup – Backboards with six 50 pair terminals"* C, and terminates the third cross connection there to achieve connectivity to the intrabuilding house and riser cable.

Clearly, this is not an efficient manner of granting access to intrabuilding house and riser facilities to CLECs, violates equal treatment, imposes excessive costs on CLECs not encountered by Verizon for selling its own services, and introduces additional potential loop troubles for CLECs (since each cross connection is a likely source of potential circuit problems).

The correct answer is simple – a direct cross connection from A to C or a direct cross connection from B to C. In the right half of Figure 1, I show a proposed method that treats Verizon and CLECs equally and fairly.

House and Riser Cable and Building Connection Construct

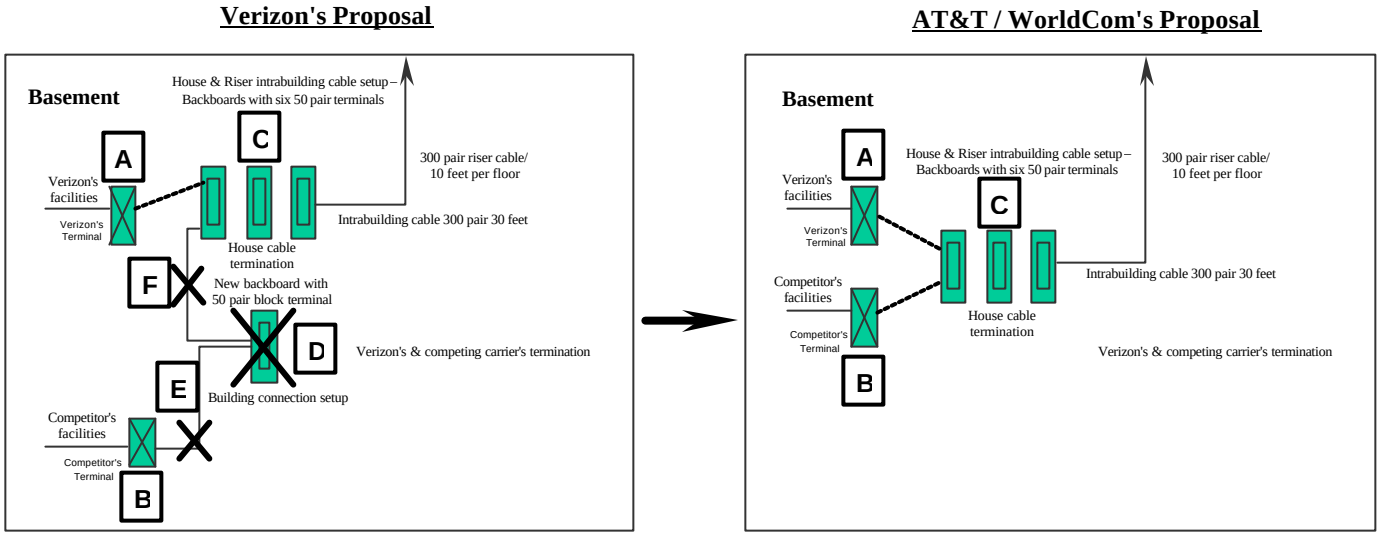


Figure 1

Under this proposed method, Verizon would terminate its entrance cable on an entrance terminal A. A CLEC would terminate its entrance cable on **its own** entrance terminal B. Verizon may run a cross connection from its entrance

terminal A to the house and riser cable termination C to gain access to those facilities for its own retail customers. A CLEC may run a cross connection from its entrance terminal B to the house and riser cable termination C to gain access to those facilities that it needs to create connectivity to its retail customers. In such an arrangement, treatment is fair, costs are appropriate, there is no prejudicial treatment of CLECs, precious building space is conserved, and circuits are not subjected to unnecessary and potentially troublesome cross connections. Verizon proposed this same inefficient means of providing house and reset cable in the *Consolidated Arbitrations*, and the Department rejected it.[44] AT&T and WorldCom strongly recommend that the Department reinforce its prior opinion on this issue, and confirm the AT&T/WorldCom proposal indicated in the right half of Figure 1.

Q. ARE VERIZON'S FILL FACTORS FOR HOUSE AND RISER CABLE APPROPRIATE?

A. No. Once again, Verizon uses an unreasonably low factor, a 40% Fill Factor this time. There is nothing unique about house and riser cable that would mitigate the extensive criticisms that I have made earlier in this testimony regarding inappropriately low fill factors. In fact, Verizon agrees that house and riser cable fill factors are no different than those that should be used for distribution cable:

> Per-unit investments [for House and Riser elements] were calculated by dividing the total investments by a utilization factor of 40 percent. This corresponds to the

[44] *See Consolidated Arbitrations*, D.P.U. 96-73/74, 96-75, 96-80/81, 96-83, 96-94 Phase 4-L (October 14, 1999) at 36.

utilization factor used in the loop study for distribution cable.[45]

Q. DO YOU AGREE WITH VERIZON'S MODELING OF THE HORIZONTAL HOUSE AND RISER RECURRING COSTS, AS DESCRIBED IN SECTION 6.D. OF ITS PANEL TESTIMONY?

A. No. For example, although Verizon certainly has information and resources to present empirical evidence regarding the length of typical horizontal cables, it has failed to produce a shred of evidence; instead, it just throws in a figure of 150 feet of cable. AT&T has performed a sample survey of 23 locations with results that indicate an average distance of 90.6 feet. Site specific information for the locations in AT&T's sample are as follows:

[45] Verizon Panel Testimony at 127.

MDU LOCATION	City, State	No. Units	Avg. Distance (ft.)
17 Clark Street	Northampton, MA	6	35
Bldgs. 15, 16, 17, Chatham Drive	Bedford, NH	6	40
Great Falls School Apts.	Somerworth, NH	16	65
Crown Colony Drive	Quincy, MA	77 (7 Bldgs.)	65
200 Falls Blvd., Bldgs. A-I	Quincy, MA	185 (9 Bldgs.)	70
438 Springfield Street	Agawam, MA	16	78
Cummings Mill Apts.	Berwick, ME	48	80
155 Kendrick Avenue	Quincy, MA	42	80
1241 Elm Street	West Springfield, MA	18	80
285 Harvard Street	Cambridge, MA	6	82
287 Harvard Street	Cambridge, MA	6	83
#72 Vine Street	Nashua, NH	22	90
#30 Bourgh Road	Concord, NH	50	90
Holyoke Farms	Holyoke, MA	25	99
#49 Technology Drive	Bedford, NH	10 (10 Bldgs.)	100
#143 Ledge Street	Nashua, NH	46	100
372, 376, 380 Hatfield Street	Northampton, MA	12	102
#40, #89 Eastern Avenue	Manchester, NH	24 (2 Bldgs.)	105
#36, #50 Pinehurst Street	Concord, NH	60	110
#5, #15, #33 Heartwood Lane	Concord, NH	90	110
Caffrey Towers, 755 Cresent Street	Brockton, MA	320	130
Campello HighRise, 1380 Main Street	Brockton, MA	398	140
#1701 Hooksett Road	Hooksett, NH	71	150
		AVERAGE	**90.6**

Q. PLEASE COMPARE AND CONTRAST VERIZON'S HOUSE AND RISER CABLE COST STUDY WITH AT&T/WORLDCOM'S HOUSE AND RISER CABLE COSTS.

A. The primary difference between Verizon's cost study and AT&T's cost study is Verizon's claim that the material and labor to install a simple 50-pair punch-down termination costs $442.09. AT&T believes that a reasonable installed cost of such a termination would be $32.00; however, I feel that such a terminal is not even necessarily required, and Dr. Mercer's direct testimony did not include a terminal at all.

In order to compare and contrast Verizon's HARC cost study with AT&T/WorldCom's HARC recommendation, the following analysis alters the

AT&T cost study to more closely align with Verizon's cost study, including the use of a 50-pair punch-down terminal and backboard. A 50 pair punch-down terminal is normally mounted with two screws (See Figure 2) on a piece of plywood, which is usually already installed by the builder in each telephone closet at the time of building construction.

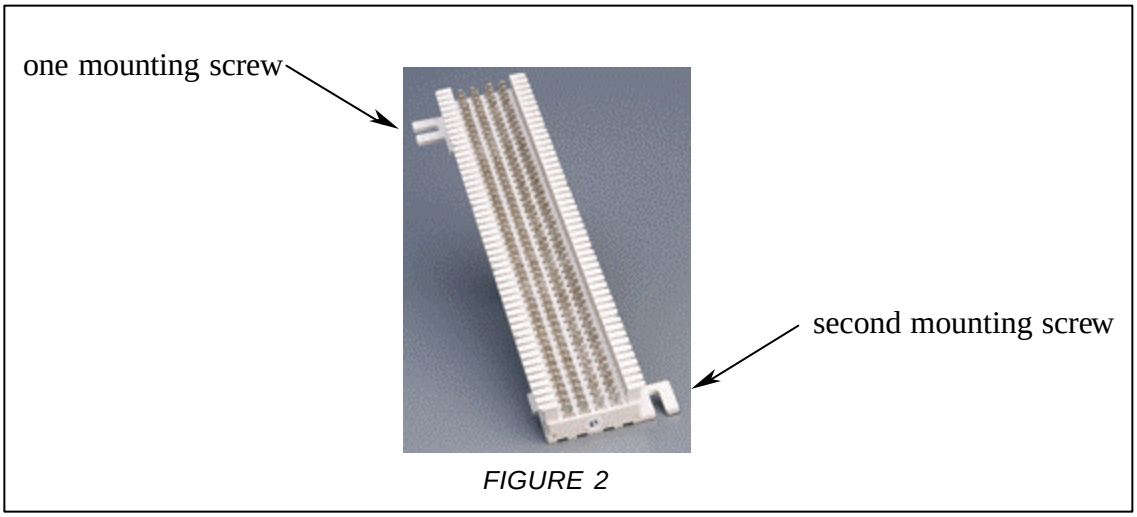


FIGURE 2

Based on my industry experience, I do not believe it is necessary to place and splice an extra 20-foot 50-pair cable stub between Verizon's 300-pair horizontal cable and its 50-pair terminal. The standard industry practice would be to strip off the outside cable sheath to expose the twelve 25-pair binder groups in the 300 pair cable (See Figure 3 below). Two of those binder groups (50 pairs) would then be terminated on one side of the punch-down terminal using a technician's standard punch down tool. Such a tool pushes each wire into one of the terminal clips and cuts off the excess wire that sticks through the clip (See Figure 4). The

FCC found that such an operation is typically performed at the rate of 200 pairs per hour.[46]

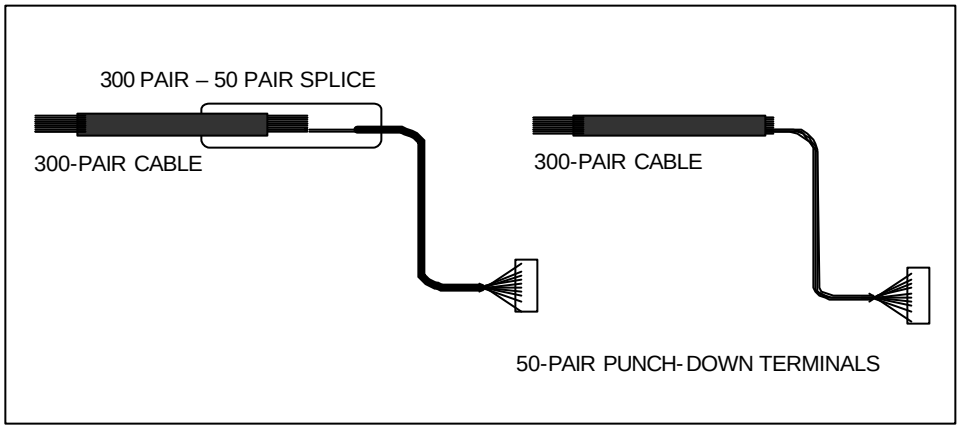


FIGURE 3

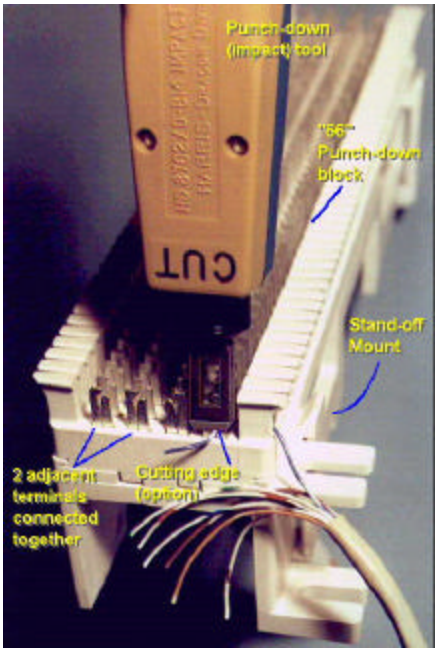


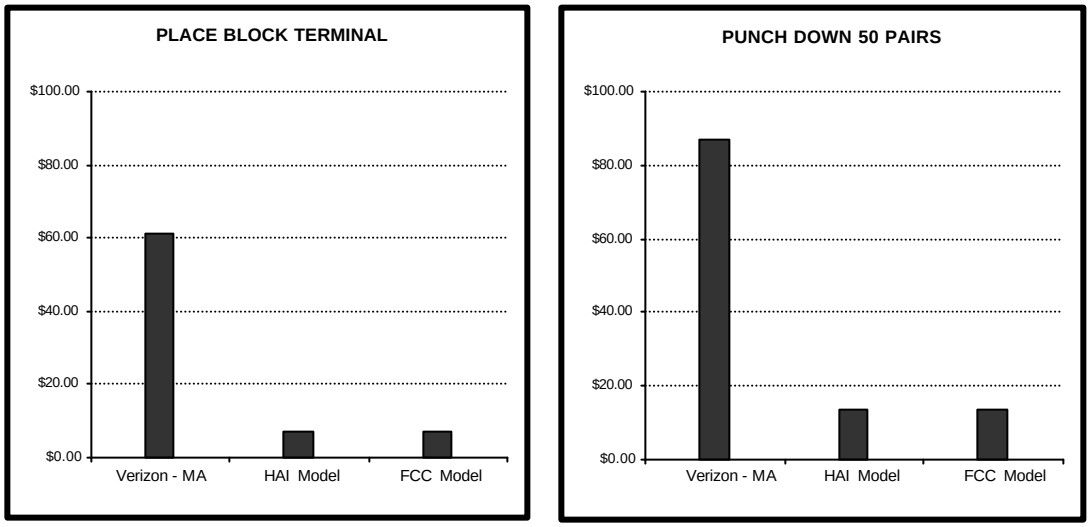
FIGURE 4

Using an unnecessary 20-foot length of 50-pair cable (stub), simply adds an unnecessary splice point to join a 50-pair cable to a 300-pair cable, and still

[46] FCC 99-120, FNPRM, *Inputs Order*, May 28, 1999, Appendix D-2, included as Exhibit JCD-3.

results in the technician stripping off the outside cable sheath to expose two 25-pair binder groups in the 50-pair cable; the two binder groups (50 pairs) would then still be terminated on one side of the punch-down terminal in the same manner as described above.

The following charts compare and contrast Verizon's alleged labor cost to (1) place a punchdown terminal block; and, (2) punch down 50 pairs onto such a terminal block, with those proposed in the HAI Model and with those proposed in the FCC's Synthesis Model:



In its *Inputs Order*[47], the FCC accepted a reasonable set of costs as follows:

47 FCC 99-120, FNPRM, *Inputs Order*, May 28, 1999, Appendix D-2.

Item	FCC Analysis & Recommendation	Verizon Recommendation
Place 50-pair punchdown terminal	1 minute per terminal	44 to 98 minutes per terminal-Floor 139 to 308 minutes per terminal-Basement
Punch down pairs onto terminal	200 pairs per hour	21 to 48 pairs per hour-Floor 7 to 16 pairs per hour-Basement
Material cost of a 50-pair punchdown terminal	$6.00 each	Not explicitly identified in HARC cost study
Labor Rate	$60.00 per hour	Not explicitly identified in HARC cost study

As described in the next paragraph, even if Verizon's unnecessary stub and extra splice is included, the FCC-approved punch-down rate of 200 pairs per hour should prevail.

For the purposes of comparison, my analysis offers an alteration of Verizon's cost study in a manner that retains all components claimed by Verizon (including the termination and placing and splicing of a 20-foot 50-pair cable stub), but adjusts the labor content to reflect what AT&T and the FCC believe are appropriate productivity numbers, adjusts the fill factor from 40% to the 64.1% level that AT&T believes is appropriate for distribution cable[48], and adjusts the horizontal cable length from Verizon's unsubstantiated 150-foot cable length to 91 feet based on a sample of such horizontal cable lengths performed by AT&T's field installation personnel.

This compare and contrast analysis focuses the fact that Verizon's material and labor cost of the termination (not its *Horizontal Cable Cost*) represents the critical

[48] AT&T's change in fill factor is done in light of the FCC's pointed criticism (in its Verizon-MA 271 decision §39) of the 40% fill factor used in the prior rate case. Please see the rebuttal testimony of Mr. Michael R. Baranowski for detailed derivation of the 64.1% distribution fill factor.

difference. Labor content is the culprit. AT&T estimates that it takes 26 minutes to travel between floors and place a simple $6 punch-down terminal block[49] and backboard. Verizon assumes that it takes 352 minutes for the same function. The analysis presented below yields a combined monthly cost for an average horizontal cable pair (91 feet of cable + termination) of **$0.271 per month for AT&T's analysis modified to include terminal cost**. If Verizon's cost study is changed to reflect reasonable labor productivity (while even retaining its extra cable stub), a 64.1% fill factor, and a 91 foot cable length, then the analysis presented below yields a monthly cost for an average horizontal cable pair (91 feet of cable + termination) of **$0.168 per month.** The two main reasons that Verizon's adjusted cost is less than the cost per line in the AT&T analysis modified to include the terminal are (1) AT&T assumes a higher monthly carrying factor, and (2) AT&T assumes a 25-pair cable rather than Verizon's 300-pair cable, which reduces the per-pair cost of Verizon's cable.

[49] *Ibid*., Appendix D-2: Includes material cost – FCC determines: 66M1-50 terminal block material = $6.00 ea. (Please see Exhibit JCD-3)

Terminal Cost	AT&T		Verizon		Verizon adjusted to AT&T productivity (min.) & fill factor (40% to 64.1%)	
	Item	Cost/mo.[a]	Item	Cost/mo.[b]	Item	Cost/mo.[c]
Travel time between floors	5 min.		53 min.		6 min.	
Place terminal block (minutes)	1 min.					
Terminal block Investment	$12.00	$0.013	$61.30	$0.108	$6.89	$0.008
Place backboard (minutes)	5 min.		53 min.		5 min.	
Backboard Investment	$5.00	$0.005	$60.27	$0.107	$5.71	$0.006
Termination rate (pairs per hour)	200 prs/hr		39 prs/hr		200 prs/hr	
Terminate pairs (minutes)	15 min.		77 min.		15 min.	
Pair-termination Investment	$15.00	$0.016	$87.15	$0.154	$17.02	$0.019
Place 20 foot cable stub (minutes)	5 min.		68 min.		5 min.	
Cable Stub Investment	Not Req'd	$0.000	$115.45	$0.204	$8.44	$0.009
Splicing (pairs per hour) stub to cable	250 prs/hr		30 prs/hr		250 prs/hr	
Splice pairs (minutes)	12 min.		101 min.		12 min.	
Pair-splicing Investment	Not Req'd	$0.000	$117.92	$0.209	$14.04	$0.015
Termination Labor (min.)	**26 min.**		**352 min.**		**43 min.**	
Termination Investment	**$32.00**		**$442.09**		**$52.09**	
Total Termination Cost per pair	**$0.64**	**$0.035**	**$8.84**	**$0.782**	**$1.04**	**$0.058**

Horizontal Cable Cost	AT&T		Verizon		Verizon adjusted to AT&T cable length & fill factor (40% to 64.1%)	
	Item	Cost/mo.[d]	Item	Cost/mo.[e]	Item	Cost/mo.[f]
per foot cable pair cost	$0.048		$0.022		$0.022	
Assumed Cable Length (ft.)	91 ft.		150 ft.		91 ft.	
Total Cable Cost per pair	**$4.33**	**$0.236**	**$3.31**	**$0.293**	**$2.01**	**$0.111**

	AT&T		Verizon		Adjusted Verizon	
Terminal + Horizontal Cable	Item	Cost/mo.	Item	Cost/mo.	Item	Cost/mo.
Total Termination Cost per pair	$0.64	$0.035	$8.84	$0.782	$1.04	$0.058
Total Cable Cost per pair	$4.33	$0.236	$3.31	$0.293	$2.01	$0.111
Terminal + Horizontal Cable	**$4.97**	**$0.271**	**$12.15**	**$1.075**	**$3.05**	**$0.168**

1

[a] AT&T's Terminal Cost/mo. is derived by multiplying the termination investment by a factor of 1 ÷ 0.641 Fill Factor ÷ 50 Terminated Pairs ÷ 12 Months per Year x (0.145540 Annual Capital Cost Factor + 0.153100 Annual Maintenance Factor) x (1+0.404600 COH & GRL Factor) = 0.0010906650

[b] Verizon's Terminal Cost/mo. is derived by multiplying the termination investment by a factor of 1 ÷ 0.40 Fill Factor ÷ 50 Terminated Pairs ÷ 12 Months per Year x (0.179020 Annual Capital Cost

Factor + 0.212895 Annual Maintenance Factor) x (1+0.08325 COH & GRL Factor) = 0.0017689256

[c] Adjusted Verizon Terminal Cost/mo. is derived by multiplying the termination investment by a factor of 1 ÷ **0.641** Fill Factor ÷ 50 Terminated Pairs ÷ 12 Months per Year x (0.179020 Annual Capital Cost Factor + 0.212895 Annual Maintenance Factor) x (1+0.08325 COH & GRL Factor) = 0.0011038537

[d] AT&T's Horizontal Cable Cost/mo. is derived by multiplying the termination investment by a factor of 1 ÷ 0.641 Fill Factor ÷ 12 Months per Year x (0.145540 Annual Capital Cost Factor + 0.153100 Annual Maintenance Factor) x (1+0.404600 COH & GRL Factor) = 0.0545332480

[e] Verizon's Horizontal Cost/mo. is derived by multiplying the termination investment by a factor of 1 ÷ 0.40 Fill Factor ÷ 12 Months per Year x (0.179020 Annual Capital Cost Factor + 0.212895 Annual Maintenance Factor) x (1+0.08325 COH & GRL Factor) = 0.0884462793

[f] Adjusted Horizontal Verizon Cost/mo. is derived by multiplying the termination investment by a factor of 1 ÷ **0.641** Fill Factor ÷ 12 Months per Year x (0.179020 Annual Capital Cost Factor + 0.212895 Annual Maintenance Factor) x (1+0.08325 COH & GRL Factor) = 0.0551926860

Q. PLEASE SUMMARIZE YOUR POSITION ON HOUSE AND RISER CABLE.

A. Although Verizon's cost study is stricken with mathematical errors, the most egregious and significant inflation of House and Riser costs is caused by unrealistic costs to install a $6.00 punch down terminal block. The Department should utilize the costs recommended by AT&T in this case (which are based on FCC inputs), or should direct Verizon to recalculate costs for 50-pair punchdown terminals using the data that the FCC found to be reasonable. In addition, the physical layout in the basement should be non-discriminatory by eliminating unnecessary cross-connections and terminations for CLECs.

IX. VERIZON'S PROPOSED COSTS FOR DARK FIBER ARE EXCESSIVE AND RESULT IN OVER-RECOVERY.

Q. WHAT IS THE MOST DIFFICULT PROBLEM FACING THE MASSACHUSETTS D.T.E. REGARDING DARK FIBER PRICING?

A. The most difficult problem facing the Department regarding dark fiber pricing is how to prevent double recovery of Verizon's costs. I will indicate why Verizon's cost studies clearly result in over-recovery of costs, and will present alternatives that the Department may consider in resolving the issue.

Q. DOES THE COMBINATION OF VERIZON'S UNE COST STUDY AND ITS DARK FIBER COST STUDY VIOLATE TELRIC PRINCIPLES?

A. Yes. TELRIC principles involve the development of investment costs, using forward-looking technologies built in a competitively efficient manner, divided by

the total demand for a network element. The most significant errors in Verizon's Dark Fiber study are created because Verizon counts the fiber cable and the structures supporting the cable twice. For POTS and special services UNEs it assumes outside plant investment for fiber cable, and the structures used to house the cable, divided by normal POTS and special services demand, with recurring costs adjusted upward by a claimed fill factor (to spread the costs for never-to-be-used-but-built facilities). Verizon then claims its costs for a parallel dark fiber cable network (which is actually the very same network) with its own fill factors (based on never-to-be-used-but-built facilities), and its own structures to house that fiber cable. This results in double counting of cable and structure costs because Verizon fails to fully allocate costs to all of the UNE's involved for a single fiber cable network.

Q. HOW DOES VERIZON'S USE OF FILL FACTORS DISTORT ITS CLAIMED UNE COSTS?

A. In its Loop cost study, Verizon assumes a fiber cable fill factor of only 60%, on top of providing twice as many fibers as necessary because it asks for 100% redundancy. As explained in my *Direct Testimony*,[50] fiber optic multiplexers commonly operate on one "send" fiber and one "receive" fiber. In 100% redundancy configurations, each "send" fiber has a second "send" fiber; each "receive" fiber has a second "receive" fiber. This is, in effect, 50% utilization. When Verizon claims an additional fill factor of 60%, the effective utilization is 60% of 50%, or only 30%. This grossly overstates the cost per fiber in use. Each

[50] Donovan Direct at 56.

pair of working fibers has two extra redundancy fibers plus 2.67 extra fill factor fibers (4 fibers ÷ 0.60 – 4 fibers = 2.67 fibers). Yet Verizon is allowed to sell the 2.67 extra fill factor fibers under the Dark Fiber UNE.

Verizon and the Department agree that the Dark Fiber UNE only applies for unused Verizon fiber strands. This is the leasing of the 40 unutilized fibers out of every 100 fibers that Verizon builds in its loop network. In such an example, the cost of the 100 fibers is allocated to the 60 fibers priced by Verizon's cost study. Verizon's cost study treats interoffice the same way, but uses a 75% fill factor.

Recalling that the appropriate use of TELRIC is total cost divided by total demand, the total cost of the 40% spare dark fiber in the loop and 25% spare dark fiber in the interoffice network have already been recovered in the UNE loop rates. To recover fiber costs again in a separate Dark Fiber UNE rate is clearly double-recovery. A solution to this dilemma must be found.

Q. WHAT IS THE MOST PRACTICAL WAY TO PREVENT DOUBLE RECOVERY OF THE COST OF A FIBER OPTIC STRAND?

A. One manner would be to declare the cost of dark fiber to be free. This cost treatment has a parallel in the costing of the high frequency spectrum of line-shared copper UNE loops utilized by xDSL services. The FCC has declared that without further manipulation, there is no additional cost for that high frequency spectrum.

A more practical approach to avoid double recovery in the case of dark fiber is to price loop and transport UNEs at an assumed 100% fiber fill rate (50% with full redundancy). Such an approach would then recover all of the cost of the cable sheath, and would assume all fibers are used. This cost per used fiber strand could then be applied to the Dark Fiber cost study.

The most correct method would be to identify the requirements for existing Loop demand plus a forecast for Dark Fiber sales, and then divide the cost of fiber cable by that complete demand. I do not recommend this alternative, however, because it would require a highly speculative Dark Fiber demand forecast.

Q. ONCE VERIZON'S COST STUDY ASKS TO SELL THE 40% SPARE FIBER IN ITS UNE LOOP, DOES IT GET EVEN WORSE?

A. Yes. Not only has Verizon asked to be allowed to resell spare fibers that have been funded by UNE Loop rates, it then makes it considerably worse by imposing another 60% fill factor on dark fiber costs (in its UNE Loop rates, Verizon divides demand for fibers by 0.60 which has the effect of multiplying costs by $1 \div 0.60 = 1.67$ – in the Dark Fiber rates, Verizon also divides the demand for the 40% of loop fibers left spare but funded by UNE Loop rates by another 0.60 which has the effect of multiplying costs of the UNE Loop-funded spare fibers by another 1.67 factor). This is additional over-recovery that makes no sense at all. Since Verizon is not required to build dark fiber for competitors, and it has taken a position not to do so, then having administrative spare on top of dark fiber is nonsensical. No matter how the Department may rule on the double recovery of

fibers between the Loop and Dark Fiber UNEs, it certainly makes no sense to allow application of a fill factor of less than 100% to dark fiber.

Q. IS THE DOUBLE RECOVERY OF FIBER CABLE COSTS THE ONLY CASE OF OVER-RECOVERY IN VERIZON'S DARK FIBER PROPOSAL?

A. No. An even more impactful problem is the over-recovery of structure costs. In effect, Verizon's dark fiber prices double count the cost of the individual spare fibers it proposes to lease, Verizon's prices double count the cable sheath – once for Loop UNEs and once again for Dark Fiber UNEs, and Verizon's prices double count the cost of poles, double counts the cost of buried structure, and double counts the cost of underground conduit, manholes, excavation, and restoral.

Q. WHAT IS THE EASIEST WAY TO RESOLVE THE SITUATION?

A. Although still not perfect from a pure TELRIC perspective, the closest and easiest solution is to use the fiber cable sheath cost per fiber, structure cost per fiber, and fiber cost per fiber, as developed under an appropriate Loop UNE model, using a 100% fill rate.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.