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BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of the Review of: Unbundled Loop and Switching Rates; the Deaveraged Zone Rate Structure; and Unbundled Network Elements, Transport, And Termination	Docket No. UT-023003

REBUTTAL TESTIMONY OF DR. TIMOTHY J. TARDIFF ON BEHALF OF VERIZON NORTHWEST INC.

May 12, 2004

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I. INTRODUCTION

Q. PLEASE STATE YOUR FULL NAME, EMPLOYER AND BUSINESS ADDRESS.

A. My name is Timothy J. Tardiff. I am a Vice President at National Economic Research Associates ("NERA"), 200 Clarendon Street, Boston, MA 021116.

Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS PROCEEDING?

A. Yes. I filed Reply Testimony on behalf of Verizon Northwest Inc. ("Verizon NW") on April 26, 2004.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. My Rebuttal Testimony responds to Mr. Turner's claims that VzLoop is incapable of accurately calculating Verizon NW's forward-looking costs of providing unbundled network elements ("UNEs") in Washington. I will demonstrate why Mr. Turner's criticisms of VzLoop are unfounded, and why, when compared to the errors and anomalies resident in and produced by HM 5.3 Revised, it is clear that VzLoop produces considerably more realistic estimates of Verizon NW's UNE costs.[1] Further, I will show that Mr. Turner's cost modeling criteria are not only an improper basis for accepting (or rejecting) a particular model, but also that, when applied to the HAI Model, Release 5.3 ("HM 5.3 Revised"), demonstrate that AT&T Communications of the Pacific Northwest, Inc.'s

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[1] Verizon NW's Rebuttal Panel responds to the substance of Mr. Turner's arguments.

("AT&T") and WorldCom, Inc.'s ("MCI") (collectively "AT&T/MCI") cost model must not be used to establish Verizon NW's UNE costs.

Q. ON WHAT BASIS DO YOU CONCLUDE THAT VZLOOP IS SUPERIOR TO HM 5.3 REVISED?

A. One of the most compelling reasons to adopt VzLoop over HM 5.3 Revised is VzLoop's superior modeling of outside plant. As Mr. Dippon explains in his Reply Testimony and illustrates by his Exhibit CMD-6, VzLoop models outside plant along realistic network routes, while "HM 5.3 Revised's modeled network is nothing but an array of cables that are intermingled with each other and routed irrespective of feasible network routes, physical boundaries, and rights-of-way."[2] HM 5.3 Revised assumes that Verizon NW's customers are uniformly spread in rectangular-shaped distribution areas -- an assumption that is entirely divorced from reality. Each of these rectangular-shaped distribution areas is assumed to contain lots of equal size and shape, which are uniformly dispersed within the distribution area. This is also an unrealistic supposition. Further, HM 5.3 Revised also assumes that each of these lots has the same line demand and an identical dispersion of equal-sized distribution terminals. HM 5.3 Revised ignores the numerous cable types and sizes deployed in real-world networks, employing generally only two types of cables and cable sizes to serve the lots in its distribution areas. HM 5.3 Revised does not take into account rights-of-way, and disregards

[2] Dippon Reply Testimony at p. 54.

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entirely physical obstacles and manmade obstructions (such as rivers, highways, freeways, and mountains) when it places outside plant. Its simplistic modeling techniques ignore crucial cost drivers and yield unrealistic economies of scale -- the result being insufficient investment and artificially low UNE cost estimates.[3]

II. VZLOOP IN GENERAL, AND ITS DIGITAL LOOP CARRIER ("DLC") EQUIPMENT COST ESTIMATES IN PARTICULAR, ARE CONSISTENT WITH ECONOMIC PRINCIPLES AND TELRIC REQUIREMENTS

Q. DO YOU AGREE WITH MR. TURNER'S CLAIM THAT VZLOOP'S REPRESENTATION OF THE LABOR TO ENGINEER, FURNISH AND INSTALL DLC EQUIPMENT VIOLATES TELRIC'S PROHIBITION AGAINST THE USE OF EMBEDDED DATA?[4]

A. No. The Federal Communications Commission ("FCC") has never prohibited the use of an ILEC's actual costs when developing forward-looking UNE costs.[5] Indeed, by claiming that Verizon NW cannot look to the costs it actually incurs when determining its forward-looking DLC equipment costs, Mr. Turner essentially argues that this Commission

[3] Before the Washington Utilities and Transportation Commission, Docket No. UT-023003, *Reply Testimony of Christian M. Dippon on behalf of Verizon Northwest Inc.* (April 27, 2004) at p. 4 ("Dippon Reply Testimony").

[4] Before the Washington Utilities and Transportation Commission, Docket No. UT-023003, *Rebuttal Testimony of Steven E. Turner on behalf of AT&T Communications of the Pacific Northwest, Inc.* (April 20, 2004, revised May 10, 2004) at p. 25 ("Turner Rebuttal Testimony").

[5] For example, the FCC described the inputs it selected for cable and structure costs as reflecting actual costs. In the Matter of Federal-State Joint Board on Universal Service; In the Matter of Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket Nos. 96-45 and 97-160, *Tenth Report and Order*, FCC 99-304 (rel. Nov. 2, 1999) ("Tenth Report and Order") at ¶ 116. The Wireline Competition Bureau used these inputs in its Virginia Arbitration Order. *See* The Wireline Competition Bureau confirmed the FCC's earlier rejection of AT&T/MCI's arguments regarding DLC inputs. Before the Federal Communications Commission, CC Docket Nos. 00-218, -249, -251, *Memorandum Opinion and Order* (rel. Aug. 29, 2003) ("Virginia Arbitration Order").

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should ignore the real-world costs Verizon has incurred installing DLC equipment, in favor of the unsubstantiated and discredited opinions of HM 5.3 Revised's engineering consultants. This not only defies common sense, it is contrary to the FCC's previous findings, in which it declined to rely on the opinions of AT&T/MCI's consultants, and explicitly rejected the DLC inputs offered by the HAI Model's proponents.[6]

Q. WHY IS INFORMATION BASED ON A COMPANY'S ACTUAL EXPERIENCE SUPERIOR TO THE UNSUBSTANTIATED OPINIONS OF CONSULTANTS?

A. As I discuss in my Reply Testimony,[7] the FCC established TELRIC for a reason: to measure the incremental costs that an ILEC actually incurs providing UNEs to competitive local exchange carriers ("CLECs"). These costs are intended to approximate the prices that would prevail if there were a competitive market for UNEs. While AT&T/MCI and Verizon NW generally agree that the FCC's TELRIC methodology should guide the parties and the Commission in determining Verizon NW's forward-looking costs of providing UNEs, the two parties have very different views on the manner in which TELRIC should be applied. By condemning Verizon NW's reference to certain characteristics of the existing network and its recent experience in installing equipment, Mr. Turner appears to contend that *any* alleged inefficiency (e.g., feeder routes not being as straight as

[6] Virginia Arbitration Order ¶¶ 326-27.

[7] Before the Washington Utilities and Transportation Commission, Docket No. UT-023003, *Reply Testimony of Timothy J. Tardiff behalf of Verizon Northwest Inc.* (April 26, 2005) at p. 7 ("Tardiff Reply Testimony").

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he thinks they should be, etc.) is grounds for an almost complete disregard of: (1) any current characteristic of the existing network, and (2) the prices Verizon NW actually pays for network equipment (such as telephone poles) and installation labor. Mr. Turner simply labels these real-world measurements "embedded," and dismisses them outright. While the FCC rejected the use of historical book (i.e., regulatory embedded) costs as a basis for UNE prices, this says nothing about the use of actual costs as a starting point for UNE pricing. Mr. Turner's criticism is tantamount to claiming that the mere mention of a characteristic of the existing network, or the costs that an ILEC has actually incurred, renders an entire study nothing more than a study of book costs, and therefore in violation of TELRIC requirements. As explained more fully below, neither of these contentions has merit.

Q. WHAT DO MR. TURNER AND AT&T/MCI OFFER AS AN ALTERNATIVE?

A. Armed with the *presumption* that the network, operations, and costs of any ILEC are inherently inefficient, and using the proscription against historical book cost pricing as license to disregard entirely any real measurements of the ILEC's current operations, Mr. Turner (and AT&T/MCI) embark on what has proven to be a misguided task: designing the network of a hyper-efficient firm and postulating what that firm would pay for that network, pole by pole, wire by wire, switch by switch, and so forth. The resulting modeled network and cost estimates are analogous to a

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competitive bid for a contract to build an entire telecommunications network from scratch (without any financial commitment to do so). And rather than subject these results to any validation checks (i.e., determining whether the routes are long enough, whether there are enough components in the network, and whether the results account for *all* the costs an ILEC incurs in providing UNEs), AT&T/MCI and their witnesses merely assert -- without any proof whatsoever -- that the algorithms used to develop HM 5.3 Revised's loop routes are TELRIC-compliant. In effect, Mr. Turner and AT&T/MCI argue that the unsubstantiated opinions of their engineering team are sufficient replacements for real-world data (with appropriate forward-looking adjustments) describing how Verizon NW has designed and operated its network. Mr. Turner's criticisms of Verizon NW's cost studies are best understood as a reflection of the distorted principle upon which HM 5.3 Revised is predicated -- i.e., except for the wire center locations, the existing network and all of its functions can be completely disregarded as irrelevant under the guise of TELRIC. Plainly, such an assumption has no merit.[8]

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Because a large portion of the costs of a telecommunications network are for capital assets with relatively long economic lives, Verizon NW properly assumes that the configuration of its actual, real-world network and the prices it pays *for forward-looking equipment* are proper starting points for determining what equipment is efficient to use going

[8] In fact, AT&T/MCI's outright dismissal of "embedded" data is entirely inconsistent with their reliance on ARMIS data to estimate the expenses of an "efficient carrier."

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forward, how much of it is needed, and the price that it would need to pay vendors to obtain it. Such an assumption is appropriate because it provides the correct basis for determining the economic costs (i.e., the resources used and the costs for those resources) that Verizon NW incurs, and that society sacrifices, when Verizon NW makes UNEs available to competitors.

Q. IS VZLOOP AN EMBEDDED COST STUDY?

A. No, absolutely not. Neither VzLoop or its inputs produce the type of embedded cost prohibited by TELRIC. This fact cannot be overemphasized. As I describe in my Reply Testimony,[9] the FCC and an increasing number of state regulators have explicitly approved methodologies that, like VzLoop, start with the existing network and look to the current costs an ILEC actually pays for network components. Such an approach does not produce the embedded costs prohibited by TELRIC.

Having established that Verizon NW has not proffered a study based on book costs (the only definition of "embedded" that TELRIC prohibits), the fundamental issue in this case is which approach is more reliable: the VzLoop approach, which starts with today's real network and makes appropriate forward-looking adjustments, or HM 5.3 Revised's approach, which attempts to create, instantaneously, a brand-new network that disregards the real-world operations of actual telecommunications carriers. Absent the production of any internal or external validation tests -

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[9] Tardiff Reply Testimony at pp. 12-13.

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- which AT&T/MCI steadfastly refuse to undertake -- AT&T/MCI are essentially asking the Commission to trust algorithms that draw unrealistic and infeasible distribution and feeder routes formulas that determine the equipment that is needed to provide service on these routes, and the generally unverified recommendations regarding prices for that equipment and the labor to install it. In contrast, VzLoop's approach starts with a realistic network design and then makes appropriate forward-looking adjustments designed to capture all the real-world costs, many of which are easy to overlook and/or very difficult to impossible to measure accurately in a cost model such as HM 5.3 Revised. While the TELRIC process certainly requires scrutiny of these measures, they are grounded not in the speculation inherent in an "optimization" algorithm or unverified input recommendations, but in the reality of experience.

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Q. HAS MR. TURNER MADE OTHER ERRONEOUS INTERPRETATIONS REGARDING TELRIC REQUIREMENTS?

A. Yes. Mr. Turner incorrectly asserts that economic costs must be based on the fiction that an efficient firm would instantly install all-new, typically large-size, equipment -- equipment that would never need to be augmented or replaced.[10] As the FCC has repeatedly recognized in the context of end-office switches, ILECs and other carriers do not purchase equipment all at once, and therefore, do not experience the fictitious "economies" that such purchases putatively entail (i.e., low initial purchase

[10] Turner Rebuttal Testimony at pp. 25-26.

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prices for switches and huge hypothetical economies from immediate installation of outside plant equipment). Introducing such unrealistically low equipment costs into a cost study necessarily means that the resulting UNE cost estimates would be far below the real economic costs that TELRIC is supposed to produce. In effect, Mr. Turner has tried to turn a modeling limitation -- the need to model the network all at once due to a lack of data on how demand developed through time -- into an input development requirement. If this position were carried through to its logical conclusion, then the input prices Verizon NW pays for material and labor should be substantially increased, due to constraints on vendors' production capacity.

III. THE ACCURACY, NOT COMPLEXITY, OF THE COST MODELS IS THE FUNDAMENTAL ISSUE IN THIS PROCEEDING

Q. IS MR. TURNER CORRECT WHEN HE SAYS THAT VZCOST IS NOT TRANSPARENT OR OPEN?

A. No. Mr. Turner criticizes VzCost's programming language Delphi Pascal on the grounds that it is "extremely difficult to see how the formulas operate…[and] how inputs are manipulated by the code."[11] He finds it "customary when evaluating cost development in UNE proceedings … to be able to trace the calculations of all the investments elements for each

[11] Turner Rebuttal Testimony at p. 13. Delphi is a product of Borland International and is a native code compiler that runs under Windows and provides visual computer career programming tools somewhat similar to those found in Microsoft Visual Basic. *See* http://www.inforingpress.com/computer_information/delphi.htm, retrieved May 6, 2004.

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UNE."[12] Based on these and similar statements, Mr. Turner concludes, "under any reasonable definition of open and transparent … VzCost fails miserably."[13]

Mr. Turner's conclusion is incorrect not only because of the reasons described above, but on the following grounds as well. First, regarding openness, Mr. Turner does not criticize the access he has been afforded to review Verizon NW's cost model; rather he complains about the complexity of the model itself. Specifically, Mr. Turner does not claim that he did not receive the necessary software and source code to review VzCost or VzLoop; instead, he claims that it is too difficult for him to understand and modify the code. This is in stark contrast to HM 5.3 Revised. As detailed in Mr. Dippon's Reply Testimony, AT&T/MCI steadfastly refuse to make certain portions of HM 5.3 Revised's preprocessing available for review.[14] Thus, unlike Mr. Turner, Verizon NW has been denied access to critical portions of HM 5.3 Revised completely.

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Second, according to Mr. Turner, in order for a model to be considered transparent, the user must be able "to trace the calculations of all the investment elements for each UNE."[15] Without a doubt, HM 5.3 Revised fails Mr. Turner's transparency criterion. As explained by Mr. Dippon, HM 5.3 Revised's preprocessing is "the result of an enormous

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[12] Turner Rebuttal Testimony at pp. 12-13.

[13] Turner Rebuttal Testimony at p. 13.

[14] Dippon Reply Testimony at p. 10.

[15] Turner Rebuttal Testimony at pp. 12-13.

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amount of unverifiable, largely undocumented, and convoluted preprocessing steps that are done outside HM 5.3 Revised by TNS and AT&T/MCI."[16] In fact, because of the lack of access to, and insufficient documentation of, the complex processes TNS used to develop HM 5.3 Revised's cluster input database, there is not a party to this proceeding that can fully understand HM 5.3 Revised's preprocessing. By comparison, as the Verizon NW Rebuttal Panel explains, all of the calculations used in VzCost's Basic Component mapping and cost study templates can be viewed and modified by the user.[17]

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Finally, while Mr. Turner questions the use of Delphi as the programming language of VzLoop, TNS's preprocessing programs and HM 5.3 Revised use several different programming languages -- SQL Server over C++, Excel, Visual Basic, and FoxPro -- none of which are any less complicated than Delphi. For example, as I explain in my Reply Testimony, HM 5.3 Revised's representation of interoffice rings is the result of an undocumented 35-page Visual Basic program.[18]

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Q. PLEASE DESCRIBE THE DIFFICULTIES YOU ENCOUNTERED WHEN TRACING THE CALCULATIONS WITHIN HM 5.3 REVISED.

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A. Tracing calculations within HM 5.3 Revised and attempting to determine how the inputs (e.g., material prices) and quantities of components it

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[16] Dippon Reply Testimony at p. 8.

[17] Before the Washington Utilities and Transportation Commission, Docket No. UT-023003, *Rebuttal Panel Testimony of Verizon Northwest Inc. on Recurring Costs* (May 12, 2004) at Section I ("Verizon Rebuttal Panel Testimony").

[18] Tardiff Rebuttal Testimony at p. 65.

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produces (e.g., feet of 25-pair cable) are manipulated to produce investment and cost levels is extremely difficult in the most simple case and virtually impossible in other more complicated ones. For example, determining the cost of a network interface device ("NID") in HM 5.3 Revised should be relatively straightforward, as the quantities of business and residential NIDs are for the most part determined by the TNS clustering process. Yet, even in this straightforward example, auditing the costs that HM 5.3 Revised produces is extremely difficult. During the depositions and workshops in the recent SBC California UNE proceeding, SBC California explored how one would trace the flow of calculations from HM 5.3's user-defined inputs to the UNE cost estimates for the NID, a rather uncomplicated network element. This process is illustrated in Joint Applicants' 14-page December 5, 2002 workshop handout.[19] The process was not quite complete at the end of the handout, which ended in the following formula (which itself references several other cells and contains a hardcoded value that cannot be changed through the user interface).[20]

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```
=IF(calculations!BD2=0,hh_tot*inputs!$C$30+(('cluste
r input data'!Y2+('cluster input data'!AX2+'cluster input
data'!AZ2)*IF('cluster input data'!X2+'cluster input
data'!Y2=0,0.6667,'cluster input data'!Y2/('cluster
input data'!X2+'cluster input
data'!Y2))))*inputs!$C$32+(1-
```

[19] *See* Tracing Formulae, HAI Model 5.3-CA, a copy of which is attached hereto as Exhibit TJT-4.

[20] R53_distribution.xls, "calculations" worksheet, column EB. Note that AT&T/MCI's presentation, unlike other slides, contained no numbers in the worksheet. Therefore, the handout falls far short of tracing the NID cost output back to the HM 5.3's input assumptions and values. The numbers are not produced by HM 5.3's standard output report -- to populate this worksheet with numerical results, HM 5.3 must be interrupted at an intermediate point.

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GR2)*GQ2+(inputs!$C$35+inputs!$C$36)*'cluster input data'!AA2,NID_indoor*lines_adj)

Thus, a complete tracing of the calculations HM 5.3 uses to produce the costs for the NID would require additional pages that reveal the contents of the terms appearing in the long formula above.

Q. HAVE THE MODIFICATIONS THAT PRODUCE COST ESTIMATES FOR HIGH-CAPACITY LOOPS INTRODUCED ANY ADDITIONAL COMPLICATIONS?

A. Yes. In fact, HM 5.3 Revised's distribution module, from which the formula above can be copied, has been greatly expanded to accommodate its new treatment of non-POTS lines, thereby making it that much more difficult to trace calculations through HM 5.3 Revised. For example, relative to HM 5.2a, the "calculations" worksheet of the module has grown from 174 to 224 columns and the "output" worksheet has increased from 54 to 103 columns. While the long chain of steps and the complicated formulas that inhibit a thorough audit of the NID costs are a carry-over from HM 5.2a, the process of auditing the new calculations to estimate the costs of non-POTS lines appears to be every bit as laborious, as illustrated by the following formula for "DS-1 fraction of business loops":

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=IF((('cluster input data'!X2+('cluster input data'!AX2+'cluster input data'!AZ2)*IF('cluster input data'!X2+'cluster input data'!Y2=0,0.3333,'cluster input data'!X2/('cluster input data'!X2+'cluster input data'!Y2)))+'cluster input data'!AW2+SA_loops+GJ2)=0,0,GJ2/(('cluster input

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data'!X2+('cluster input data'!AX2+'cluster input data'!AZ2)*IF(('cluster input data'!X2+'cluster input data'!Y2)=0,0.3333,'cluster input data'!X2/('cluster input data'!X2+'cluster input data'!Y2)))+'cluster input data'!AW2+SA_loops+GJ2))[21]

Clearly, whatever regulatory scrutiny HM 5.2a and earlier releases of the HAI Model may have received, it is still extremely difficult, if not impossible, to trace calculations within HM 5.3 Revised and determine how HM 5.3 Revised's inputs and quantities of components are manipulated to produce investment and cost levels.

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Q. WHEN IS IT IMPOSSIBLE TO AUDIT COMPLETELY HM 5.3 REVISED'S OUTSIDE PLANT CALCULATIONS?

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A. Generally speaking, whenever distance comes into play, it is impossible to trace HM 5.3 Revised's outside plant calculations, as these distances are determined by TNS *prior to* any calculations done by HM 5.3 Revised. For example, as Mr. Dippon's Reply Testimony describes, the clustering process determines the number and sizes of distribution areas (clusters) and generally determines the placement of the SAI(s) within these clusters.[22] Consequently, the lengths of feeder and distribution cables, which in turn, are used to determine whether DLC equipment and fiber feeder are deployed, are the result of TNS's preprocessing. As such, it is impossible to "identify … engineering calculations, and the like,"[23] because these fundamental engineering assumptions are contained in TNS's

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[21] R53_distribution.xls, "calculations" worksheet, column GR.

[22] Dippon Reply Testimony at p. 16.

[23] Turner Rebuttal Testimony at p. 13.

preprocessing code, which: (1) is not revealed within HM 5.3 Revised, and (2) has not been provided to the Commission or Verizon NW during this proceeding.[24]

Q. ARE RELEVANT INPUT CHANGES WITHIN HM 5.3 REVISED ALWAYS A ONE-STEP PROCESS THAT ENDS WITH "PRESS[ING] A BUTTON TO RUN THE MODEL?"[25]

A. No. Some input changes in HM 5.3 Revised are extremely difficult, if not impossible, to make. Important assumptions cannot be changed, as they are hard-coded in HM 5.3 Revised's preprocessing. Moreover, even if they could be changed, these and other input changes would require a deep understanding of HM 5.3 Revised's preprocessing and involve a significant amount of time, as many of the processing steps are manual, expensive, require complicated software environments, and utilize extensive computer hardware.

For example, HM 5.3 Revised assumes that high-rise buildings consist of 536 lines or more.[26] This number is hard-coded and cannot be changed. However, even if such a change were possible, Mr. Dippon informs me that the following steps are required to make a simple change

[24] Dippon Reply Testimony at pp. 8-11.

[25] Turner Rebuttal Testimony at p. 18.

[26] Mr. Murphy demonstrated in his Reply Testimony that HM 5.3 Revised's treatment of indoor versus outdoor SAIs is a serious flaw in outside plant design. Murphy Reply Testimony at pp. 27-30. Therefore, modifying how the model determines when indoor SAIs should be used (i.e., when it represents high-rise buildings) is essential in testing the complete ramifications of this design flaw.

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in how HM 5.3 Revised defines high-rise buildings (and thus indoor SAI investment):

1. Obtain the necessary files and documents for the change from AT&T/MCI.
2. Open the source code for the clustering algorithm, make the appropriate change, and recompile the software.
3. Load the first wire center's cluster input file.
4. Run the clustering software for the first wire center.
5. Save the resulting output files in their respective directories.
6. Repeat steps 2 through 5 ninety-eight times -- that is, once for each wire center.
7. Run "clust_process.prg," a FoxPro program.
8. Run "import_points.prg," another FoxPro program.
9. Import one specific output file from step 8 into step 1 of PointCode (a series of MS Access databases).
10. Import the "dsl_distr.dbf" table and rename it to "DSL."
11. Run queries 0a, 0b, 0c, 1, 2, 3, 4, 5, 6, 7, 8, 9 in Database 1 of PointCode.
12. Open Database 2 of PointCode.
13. Delete the "old" "PNR501" table in Database 2.
14. Import PNR501 from Database 1 of Point Code.
15. Run query 8.
16. Review the "Summary Check Table."
17. Open Database 3 of PointCode.
18. Delete the "old" "PNR501" in Database 3.
19. Import "new" "PNR501" from Database 3.
20. Go to "Macros" and run "Dataset Creation."
21. Open Database 4 of PointCode.
22. Delete "cluster data" table.
23. Import "cluster data" table from Database 3.
24. Run query "Make Summary Table" and check summary table.

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25. Open Database 6 of PointCode. [27]
26. Delete "cluster data" table.
27. Import "cluster data" from Database 4.
28. Run the two queries in Database 4.
29. Open Databas e 7 of PointCode.
30. Delete "cluster data (prenormalized)" table.
31. Import new "cluster data (prenormalized)" table.
32. Run queries 1, 3, 4, 5c, 6, 7a, 7b, 8, 9 in Database 7.
33. Load the output of step 32 into an MS Access database, labeled "Rename."
34. Run queries in "Rename.mdb."
35. Export result of step 17 as "Olist.dbf."
36. Save Olist.dbf in appropriate directory.
37. Run "rename_outlier_hicap_to_main_v1.prg," another Fox Pro program.
38. Import result of step 20 into PointCode.
39. Rerun steps 9-32.
40. Insert a column into the output of step 39.
41. Import result of step 40 into hm.mdb.
42. Run HM 5.3 Revised.

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This process requires numerous manual steps outside of HM 5.3 Revised, and entails the use of a number of software programs, such as Fox Pro, MS Access, and Excel, to complete the steps described above. As explained by Mr. Dippon: "It takes about two to three days to perform a simple sensitivity test."[28] In short, it is extremely difficult to make certain input changes in HM 5.3 Revised.

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[27] There seems to be no Database 5.

[28] Dippon Reply Testimony at p. 52.

Q. IS HM 5.3 REVISED'S MULTIPLE-PLATFORM APPROACH SUPERIOR TO VZCOST'S WEB-BASED PLATFORM?

A. No. It is certainly not more difficult to run a model on a web-based platform than one that requires multiple platforms like HM 5.3 Revised. While AT&T/MCI may want the Commission and other parties to believe that their model can be run exclusively on a personal computer ("PC"), this is simply is not true. As discussed by Mr. Dippon, one of the most important components of HM 5.3 Revised is the cluster input database.[29] This database is developed by TNS outside of HM 5.3 Revised. The creation of the cluster input database is incredibly complex and requires the use of Microsoft SQL Server 2000, a database program that cannot be run on a PC, but instead requires a server.[30] Thus, in order to run sensitivities necessary to evaluate HM 5.3 Revised, a user requires not only a server, but also various different (and costly) server and PC software components.[31]

Q. IS HM 5.3 REVISED A "BLACK BOX," AS MR. TURNER USES THE TERM?

A. Yes. Mr. Turner claims that VzCost's "fatal flaw … is black box loop modeling program VzLoop," which appears to be reason enough for Mr.

[29] *See* Dippon Reply Testimony at pp. 7-8.

[30] A server is a computer that runs server applications. Typically, a server is more powerful than a PC.

[31] TNS lists the following software components necessary for a review of HM 5.3 Revised's preprocessing: Centrus Desktop 4.01, FoxPro Version 6.0, MapInfo Professional, Version 7.0; Microsoft Access 2000, Microsoft SQL Server 2000 and PERL Interpreter.

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Turner to recommend that the Commission reject VzCost entirely.[32] Curiously, Mr. Turner's sole support for this recommendation is the alleged difficulties and complexities in understanding VzLoop. As described above, the difficulties encountered by a particular individual in an attempt to understand a model is not a reason for adopting or rejecting it. Moreover, applying Mr. Turner's criteria to his own model demonstrates that HM 5.3 Revised -- not VzCost -- is a "black box" that should be rejected by the Commission. HM 5.3 Revised, along with its preprocessing, is highly complex, often convoluted, and insufficiently documented. Yet, complexity is not the dispositive issue here, accuracy is. As Messrs. Dippon, Murphy, and I demonstrate in our Reply Testimonies (and numerous state regulatory commissions have found), HM 5.3 Revised and its predecessor releases ignore important cost drivers, model a network that makes no sense, and estimates costs that are completely divorced from reality. As Mr. Dippon illustrated and I summarize below, with respect to modeling outside plant, VzLoop produces far more reasonable and verifiable distribution and feeder routes than HM 5.3 Revised.

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IV. VZLOOP'S OUTSIDE PLANT DESIGN IS FAR SUPERIOR TO HM 5.3 REVISED'S

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Q. WHAT ARE SOME OF MR. TURNER'S SPECIFIC CRITICISMS OF VZLOOP'S OUTSIDE PLANT DESIGN?

[32] Turner Rebuttal Testimony at p. 22.

A. Mr. Turner alleges that: (1) VzLoop's routes are inefficient; and (2) it misplaces SAIs. Mr. Turner is wrong on these and other counts, as described more fully in the Verizon NW's Rebuttal Panel Testimony.[33] However, to the extent that such criticisms are grounds for rejecting a cost model, HM 5.3 Revised is noticeably deficient in each of these areas, as described more fully below.

Q. DOES HM 5.3 REVISED PLACE SAIS IN A MORE REASONABLE MANNER THAN VZLOOP?

A. No. To the contrary, there is compelling evidence that VzLoop is far superior to HM 5.3 Revised in terms of SAI placement. Generally, VzLoop places SAIs according to where they are located in the real world. VzLoop then makes a number of modifications to this layout to reflect the forward-looking nature of the modeled network. HM 5.3 Revised, on the other hand, places the modeled SAIs in locations where no real-world local exchange carrier, including new entrants, would or could ever place them.[34] Mr. Dippon, in his Reply Declaration, explains in detail the fundamentally flawed method employed by HM 5.3 Revised.[35] As can be seen in Mr. Dippon's Exhibit CMD-6 and the following examples, relative to VZLoop, HM 5.3 Revised does an inferior job of placing SAIs.

Wire Center	Cluster	Comments

[33] Verizon Rebuttal Panel Testimony at Section II.

[34] *See* Dippon Reply Testimony at p. 29 (demonstrating that HM 5.3 Revised places SAIs in the middle of lakes).

[35] *See* Dippon Reply Testimony at pp. 75-76.

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Anacortes	c001	SAI in water.
Anacortes	c004	SAI in water.
Bothell	c018	SAI on major road.
Birch Bay	c002	SAI in water.
Brewster	c003	SAI in water.
Burlington	c006	SAI in water.
Chelan	c008	SAI in water.
Conway	c003	SAI on major road.
Coupeville	c005	SAI in water.
Edison	c003	SAI in water.
Entiat	c001.001	SAI on major road.
Everett Main	c004	SAI on major road.
Kennewick-Highlands	c017	SAI on major road.
Kennewick Main	c010	SAI in water.
Manor Way	c009	SAI in water.
Newport	c018	SAI in water.
Richland	c001	SAI in water.
Redmond	c001	SAI in water.
Woodland	c002	SAI in water or on major road.

Q. DOES HM 5.3 REVISED PLACE SOME SAIS CLOSE TOGETHER?

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A. Yes. While Verizon NW's Rebuttal Panel responds to this criticism in the context of VzLoop and demonstrates that there is no material problem,[36] with respect to HM 5.3 Revised, a significant number of SAIs are modeled in close proximity to one another. First, as Mr. Murphy explains, HM 5.3 Revised models unrealistically large distribution areas.[37] This results in SAIs being placed side-by-side in 112 of the 829 of the main clusters modeled by HM 5.3 Revised. Thus, 224 (2 x 112) of the 1,104 SAIs represented by HM 5.3 Revised are contiguous by design. Second, in the Bothell wire center (which Mr. Turner uses to illustrate VzLoop's alleged

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[36] Verizon Rebuttal Panel Testimony at Section II.

[37] Murphy Reply at p. 42.

problem), HM 5.3 Revised models four pairs of SAI locations within 300 yards of one another; and each of these pairs has multiple SAIs at one of the locations. Consequently 12 of the 38 SAIs placed by HM 5.3 Revised in the Bothell wire center are in close proximity to other SAIs.

Q. DOES VZLOOP OVERSTATE DISTRIBUTION CABLE?

A. No. While Mr. Turner claims in his Rebuttal Testimony that "the distribution cable distance [in VzLoop] is systematically overstated,"[38] as Mr. Dippon clarifies in his Reply Testimony, a substantially larger proportion of cable distances are classified as distribution rather than feeder in HM 5.3 Revised -- not surprisingly, as feeder cable is more expensive. VzLoop, on the other hand, places relatively more feeder cable.[39] In addition, as I describe in my Reply Testimony, HM 5.3 Revised also tends to place the wrong amounts of equipment in the wrong areas, thereby producing relatively higher costs in low-density areas and relatively lower costs in high-density areas.[40]

Q. DOES USING AN ESTABLISHED NETWORK AS A STARTING POINT INVALIDATE VZLOOP'S FORWARD-LOOKING NETWORK DESIGN?

A. No, absolutely not. In an attempt to demonstrate that the existing network could be inefficient, Mr. Turner speculates:

[38] Turner Rebuttal Testimony at p. 36.

[39] Dippon Reply Testimony at p. 64. As Mr. Murphy explains in his Reply Testimony, HM 5.3 Revised erroneously assumes that the cable connecting the outlier clusters is distribution, rather than feeder, when estimating placement costs and reporting distribution and feeder route distances. Murphy Reply Testimony at pp. 59-62.

[40] Tardiff Reply Testimony at pp. 30, 73-74.

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> [E]ngineers typically construct underground conduit systems along no-cost public rights-of-way adjacent to or within roadway rights-of-way. If a large tract of land was undeveloped 25 years ago, when Verizon engineered its feeder route, it might have placed conduit around the perimeter of the tract. Today, roadways lace that tract of land, and an efficient company would place conduit using a shorter distance -- along the roadways that cross the tract.[41]

Apart from the fact that Mr. Turner's concerns about VzLoop's routing of outside plant are entirely unsubstantiated,[42] the maps that Mr. Dippon generated for VzLoop and HM 5.3 Revised clearly illustrate the superiority of the former. As discussed in Mr. Dippon's Reply Testimony, these maps demonstrate that HM 5.3 Revised's network is entirely unrealistic.[43] VzLoop, on the other hand, generally models its outside plant along feasible network routes (e.g., such as along roads), which Mr. Turner acknowledges is appropriate. Moreover, should the tract of land Mr. Turner contemplates become available for development, it would be economically inefficient (i.e., a waste of resources) for Verizon NW to abandon the facilities and routes serving the surrounding area. In any event, this area would need to be served somehow and the bulk of the cost (i.e., the placement of distribution cable) would be required whether the feeder plant was rerouted or not.

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[41] Turner Rebuttal Testimony at p. 37.

[42] Mr. Turner's example above is completely hypothetical, because a tract of land that was undeveloped 25 years ago might or might not: (1) have feeder routed around its parameter, (2) have roads laced through it, and (3) create shorter distances when served by these roads.

[43] Dippon Reply Testimony at pp. 26-31.

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Mr. Turner continues by saying that "Verizon has not offered any proof that the loop lengths and amount of outside plant that underlie its cost study reflect an efficient, forward-looking network."[44] It is curious that Mr. Turner makes such a criticism in light of the fact that HM 5.3 Revised's network is entirely hypothetical and completely unsupported.[45] In contrast, VzLoop starts with actual network components and models its forward-looking network using real-world, cost-minimizing engineering guidelines. Reviewing VzLoop's outside plant routing, as illustrated by Exhibit CMD-6 to Mr. Dippon's Reply Declaration, establishes that VzLoop generally models its network routes along *current* roads -- exactly as Mr. Turner says a cost model should do. This is vastly superior to HM 5.3 Revised's "grills" of cables, which are intermingled with each other and placed without regard to feasible network routes, physical boundaries, and rights-of-way.

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Q. PLEASE RESPOND TO MR. TURNER'S CRITICISMS OF VZLOOP'S DISTRIBUTION AREAS IN THE BOTHELL WIRE CENTER?

A. Mr. Turner's concerns about distribution areas in the Bothell wire center entirely ignore the larger picture; that is, the overall accuracy of the two models. I have reproduced two maps contained in Mr. Dippon's Exhibit CMD-6. The map on the left illustrates how HM 5.3 Revised attempts to

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[44] Turner Rebuttal Testimony at p. 37.

[45] Indeed, as I observe in my Reply Testimony, and the Verizon NW Rebuttal Panel's Testimony describes in detail, VzLoop's loop lengths are considerably more precise than the loop lengths produced by HM 5.3 Revised. *See* Tardiff Reply Testimony at p. 97; Verizon Rebuttal Panel Testimony at Section I.

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model outside plant in the Bothell wire center. The map on the right illustrates how VzLoop models plant in the same wire center. As becomes clear after reviewing the distribution routes (red) against the road network (black), VzLoop follows roads much more closely than HM 5.3 Revised. In fact, HM 5.3 Revised's distribution plant not only includes "backbone" and "branch" cable grills with considerable overlap, but substantial portions of the distribution grills are also not even close to roads. Therefore HM 5.3 Revised improperly estimating the costs associated with providing loops.

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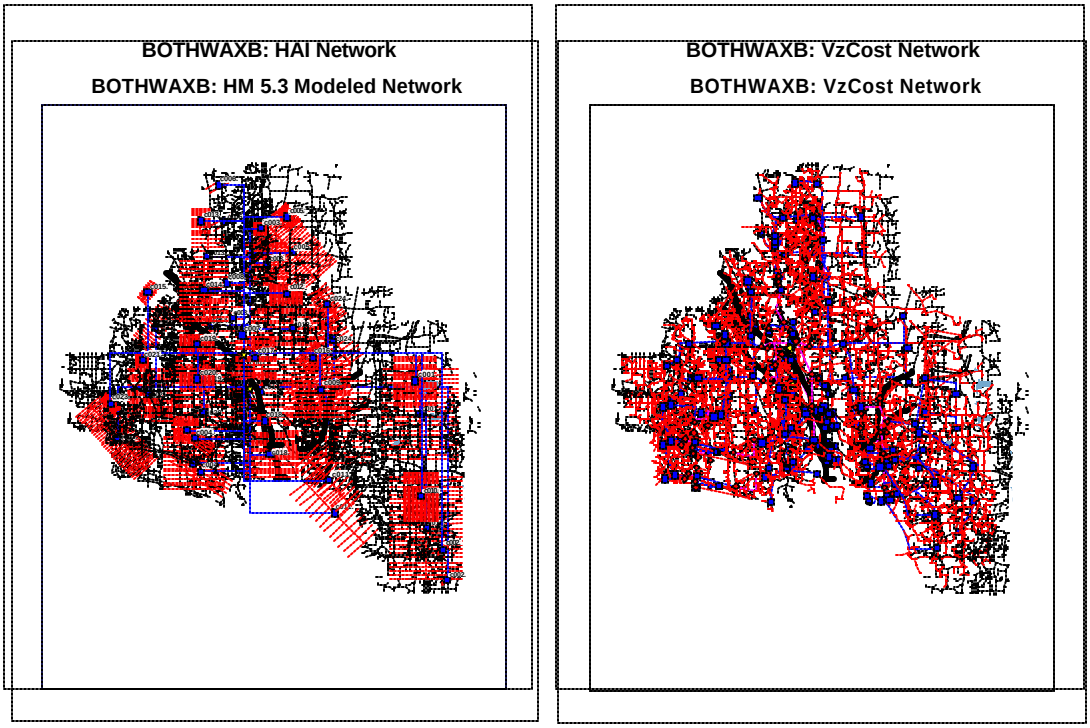

Map 1

Q. DOES THIS COMPLETE YOUR REBUTTAL TESTIMONY?

A. Yes.