BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of the Pricing Proceeding for Interconnection, Unbundled Elements, Transport and Termination, and Resale	)	**DOCKET NO. UT-960369**
In the Matter of the Pricing Proceeding for Interconnection, Unbundled Elements, Transport and Termination, and Resale for U S WEST COMMUNICATIONS, INC.	)	**DOCKET NO. UT-960370**
In the Matter of the Pricing Proceeding for Interconnection, Unbundled Elements, Transport and Termination, and Resale for GTE NORTHWEST INCORPORATED	)	**DOCKET NO. UT-960371**

REBUTTAL TESTIMONY OF

DAVID G. TUCEK

ON BEHALF OF

GTE NORTHWEST INCORPORATED

SUBJECT: LOOP DEAVERAGING PROPOSALS

FEBRUARY 7, 2000

Q. PLEASE STATE YOUR FULL NAME AND BUSINESS ADDRESS.

A. My name is David G. Tucek. My business address is 1000 GTE Drive, Wentzville, MO 63385.

Q. ARE YOU THE SAME DAVID G. TUCEK WHO PREVIOUSLY FILED DIRECT AND RESPONSIVE DIRECT TESTIMONY IN THIS PROCEEDING?

A. I am.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. On behalf of GTE Northwest Incorporated ("GTE"), my rebuttal testimony addresses two key issues that are touched on by several of the witnesses in this proceeding. The first of these issues deals with the assumption made by several witnesses that it does not matter which cost model the Commission uses to deaverage loop costs, since the estimates of costs at the wire center level will be rescaled to the Commission ordered statewide average. The second deals with the question of whether loop costs should be deaveraged at the wire center or exchange level. My testimony also responds to the testimony filed on January 18, 2000 by AT&T witness Douglas Denney, and describes an analysis of the size of the serving area modeled by HM 3.1 based on the workpapers that AT&T provided GTE on January 11th. Finally, my testimony responds to certain issues covered in the testimony filed

on January 18, 2000 by U S WEST witness Michael A. Carnall, Nextlink, *et. al.*, witness William Page Montgomery, and Staff witness Thomas L. Spinks. Filed along with my testimony are eleven exhibits, identified below as Rebuttal Exhibits DGT-1 through DGT-11.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. My testimony establishes that the model used to develop deaveraged loop rates does matter, even if all of the candidate models are highly correlated and are rescaled to the Commission ordered statewide average. Consequently, before developing a deaveraging proposal, one must determine if a given model estimates loop costs across wire centers with sufficient accuracy. Because we cannot compare the estimates produced by each model with the observed forward-looking costs -- that is, after all, why we must pick a model -- my testimony analyses the models' relationships with three cost drivers that determine loop costs at the wire center level: (1) the size of the wire center in lines; (2) the size of the serving area in square miles; and (3) the proportion of loops that are greater than 12 kilofeet in length. The results of this analysis demonstrate for GTE that GTE's own wire center cost estimates are best suited as the starting point for developing deaveraged rates. The analysis also shows that neither BCPM, HM 3.1 or HAI 5.0a are suited for such a purpose. In particular, whatever relationship that exists between the cost drivers

and the cost estimates produced by these models breaks down as the cost per loop increases. Consequently, use of any of these models as a deaveraging tool will skew the final results.

My testimony also establishes that, while variations in costs should be examined at the wire center level, there may be valid reasons to constrain the proposal so that wire centers serving the same exchange are in the same zone. Should the Commission come to this conclusion, my testimony offers a method to impose this constraint and provides two examples using GTE's wire center costs.

With respect to the January 18th testimony of AT&T witness Douglas Denney, my rebuttal testimony responds to his claim that HAI 5.0a is merely an updated version of HM 3.1, which is the version of the Hatfield model that is part of the record in this proceeding. I show that HAI 5.0a is an entirely different model than HM 3.1, particularly with respect to the determination of loop costs at the wire center level. Moreover, I show that HAI 5.0a is seriously flawed and that its purported distinguishing feature -- use of geocoded data -- is one of the main reasons why it cannot be used to develop a deaveraging proposal. I also present an analysis that shows that HM 3.1 grossly overestimates the size of the serving areas for both GTE's and U S WEST's wire centers in Washington.

Finally, my rebuttal testimony addresses certain issues raised by U S WEST witness Michael A. Carnall, Nextlink, *et. al.*, witness William Page Montgomery, and Staff witness Thomas L. Spinks. Mr. Carnall has criticized Staff's distance-based deaveraging proposal for overlooking determinants of loop cost other than distance and density, and for relying on a level of data that does not contain enough information for the intended purpose. Mr. Carnall is correct in his criticisms. The implication of the first is that Staff has relied on a regression equation whose parameters are likely to be biased. The implication of the second criticism is that, while no one would dispute the contention that loop costs are affected by distance and density, Staff's analysis relies on data in which other factors that determine the costs of individual loops have been averaged out. Mr. Montgomery has incorrectly claimed that all of the deaveraging proposals presented in direct testimony tie to the Commission's ordered statewide average. This is not the case for AT&T's proposal, as I pointed out in my responsive testimony and as both Mr. Spinks and Mr. Denney have acknowledged. Mr. Montgomery's claim that Staff's analysis demonstrates length is a more important determinant of loop costs than density is based on faulty logic, as I explain below. Mr. Montgomery has also suggested that this Commission adopt a distance-based deaveraging proposal even if the data to support it do not exist -- this suggestion should be ignored. Mr. Spinks has claimed that AT&T's proposal does not constitute geographic deaveraging and that GTE's cost model

does not use detailed geographic information on wire center and customer location estimates. Both of these claims are wrong. Although AT&T's proposal is flawed for several reasons, it nevertheless constitutes geographic deaveraging. GTE's cost model utilizes the actual distribution of loop lengths in estimating costs. Moreover, the alternative methodology that I presented in my responsive testimony has extended the model's use of this information to the wire center level, making the overall results more accurate and making it the preferred choice upon which to base deaveraged loop rates in GTE's Washington network.

Does the Model Matter?

Q. WHICH PARTIES HAVE ASSUMED THAT IT IS UNIMPORTANT WHICH MODEL IS USED TO DEAVERAGE LOOP COSTS?

A. In their January 18th testimonies, both Mr. Denney and Mr. Montgomery have espoused the view that choice of the model will have little or no effect on the deaveraging proposals. Both Mr. Denney and Mr. Spinks made similar statements in their direct testimonies. The relevant portions of these testimonies and the corresponding citations appear on page 1 of Rebuttal Exhibit DGT-1. Additionally, these and other witnesses have made statements that rely on the assumption that the chosen model accurately estimates relative costs across wire centers. The relevant portions of these testimonies and the corresponding citations appear on

page 2 of the exhibit. Obviously, the witnesses appearing on both pages of the exhibit cannot have it both ways. That is, they cannot maintain that choice of the model doesn't matter and at the same time make statements that rely on the relative accuracy of the chosen model. To the extent that they rely on the Hatfield model, they can have it neither way -- my testimony below demonstrates not only that the model does matter, but also that both HM 3.1 and HAI 5.0a are flawed and unsuited for developing deaveraged loop costs.

Q. WHY DO THESE WITNESSES MAINTAIN THAT THE MODEL DOES NOT MATTER?

A. Both Mr. Spinks and Mr. Montgomery cite the fact that the model results will be rescaled to the Commission ordered statewide average as a reason why choice of the model will have little or no effect on the deaveraged results. Additionally, Mr. Spinks states that "in the Staff's experience the relative cost estimates between wire centers in the models [BCPM and HAI] are fairly consistent between models".[1] Mr. Denney has relied on the calculated correlation between the wire center cost-per-line estimates produced by HM 3.1 and BCPM. As I demonstrate below, Mr.

[1]In response to GTE's Data Request Number 1, Mr. Spinks indicated that the cited experience consisted of a review of 33 wire centers serving approximately 60,200 lines. None of these wire centers are part of GTE's or U S WEST's network, and slightly more than half serve less than a thousand lines.

Denney has chosen the wrong analytical tool to test the premise that the model does not matter.[2]

Q. DOES CHOICE OF THE MODEL MATTER, EVEN IF THE WIRE CENTER COSTS ARE RESCALED TO THE COMMISSION ORDERED STATEWIDE AVERAGE?

A. Yes, it does. It is likely that GTE will experience competition from unbundled loops only in the low-cost zone -- Mr. Montgomery has acknowledged this at pages 9-10 of his responsive testimony. If the model does not produce cost estimates that are relatively accurate across wire centers, and if it instead assigns a disproportionately small share of costs to the low-cost zone, GTE will be prejudiced by the resulting deaveraged rate even if the rates for all zones are consistent with the ordered statewide average for GTE. Mr. Denney has recognized this phenomenon in the first footnote in his January 18th testimony. To hold otherwise reveals a basic misunderstanding of the calculations underlying the geographic deaveraging of loop costs.

[2]Additionally, in footnote 3 of his January 18th testimony, Mr. Denney has mischaracterized Mr. Spinks' testimony. Staff did not find a "high correlation" between BCPM and HAI 5.0a. Nothing in Mr. Spinks' workpapers or in his response to GTE's data request indicates that he calculated any correlation at all.

Q. CAN YOU EXPLAIN THE CALCULATIONS UNDERLYING THE GEOGRAPHIC DEAVERAGING OF LOOP COSTS?

A. Yes. An example of these calculations is presented in Rebuttal Exhibit DGT-2 for two alternative cost structures whose per-line costs are almost perfectly correlated. In this exhibit, the two sets of loop costs appear in the columns (6) and (9) and are determined by two equations, numbered 1 and 2, which appear at the bottom of the page. Columns (4) and (7) present the total loop costs for each equation, and Columns (5) and (8) present the relative share of costs for each wire center. The correlations between these three pairs of columns are reported in the box at the lower left. The average cost per line is $26.71 and $24.76 for equations 1 and 2, respectively. An adjustment factor is calculated for each equation by dividing the target cost per line -- $23.94 in this example -- by the average cost per line for each equation. Multiplying the costs from each equation by the corresponding adjustment factor produces the rescaled wire center costs in columns (10) and (11). The zone assignments appear in Column (1) -- in this example, I have chosen the zones to leave roughly one-third of the lines in each zone. The total costs for each equation by zone appear in Columns (12) through (17), and the last three columns show the lines by zone. Dividing the sum of the total costs for each zone by the corresponding sum of the lines produces the average costs by zone, which tie back to the target statewide average by construction. The resulting deaveraged rates for

each equation are summarized in the box at the lower right. Even though the two sets of costs are both rescaled to the same average value, the difference in the deaveraged rates is substantial and exceeds 50 percent in the lowest cost zone -- clearly, the choice of the model matters. Moreover, the large differences in the deaveraged rates occur even though the two sets of costs are highly correlated -- clearly, Mr. Denney has chosen the wrong analytical tool.

Q. HOW COULD ONE TEST THE PREMISE THAT THE MODEL DOES NOT MATTER IN ANY GIVEN CASE?

A. One straightforward way is to examine the resulting deaveraged costs for each set of wire center costs, using the same set of wire centers, the same line counts and the same rule to determine the zone definitions in each case. I have done this in Rebuttal Exhibit DGT-3 for three sets of costs that have been provided in various witnesses' testimonies and workpapers. These are (1) the GTE wire center costs that I presented in my responsive testimony; (2) the HM 3.1 costs that Mr. Denney relied on; and (3) the BCPM costs, taken from his workpapers, that Mr. Denney relied on in calculating his HM 3.1 and BCPM correlation coefficient.

In preparing this exhibit, I used the line counts described at page 9 of my responsive testimony, and corrected the HM 3.1 costs for the errors described at pages 5-7 of

my responsive testimony. Also, in this exhibit, I defined the zone cutoffs to leave roughly one-third of each company's lines in each zone.[3] In looking at this table, it is again quite clear that the choice of the model does matter and that the first step in developing any deaveraging proposal must be to evaluate the relative accuracy of the candidate models across wire centers.[4]

Q. HOW MIGHT ONE EVALUATE THE RELATIVE ACCURACY ACROSS WIRE CENTERS?

A. Ordinarily, one evaluates a model by comparing the predicted results with observed actuals, using various "goodness-of-fit" measures that summarize the strength of the relation between the predicted and actual values, or the size of the error associated with the model's estimates. In this instance, the forward-looking loop costs are unknown -- that is why we are trying to pick a model. As an alternative to comparing the model results with the unobservable forward-looking costs, we must compare the estimated wire center costs with wire center characteristics, or cost drivers, known to be related to loop costs. If the estimated wire center costs

[3]Note that the exact mix of wire centers across zones will vary due to differences in the relative wire center costs produced by each model.

[4]I have included the results of using an average of the GTE and HM 3.1 wire center costs, and of using the average of the GTE, HM 3.1 and BCPM costs in this exhibit. The resulting Zone 1 rates are higher than any of the rates using the individual components because the composition of Zone 1 changes under each scenario.

produced by a given model vary consistently with wire center characteristics related to loop costs, then one should be confident that the model produces relatively accurate estimates of loop costs across wire centers. Conversely, if there is no relationship between the model estimates and the cost drivers, or if the relationship breaks down for a certain class of wire centers, then one cannot have confidence in the model's relative accuracy across wire centers and it is not suitable for use in developing deaveraged rates. I provided an example of such an analysis in my responsive testimony, at pages 16-17. There, I presented the results of several regressions of wire center loop costs on three cost drivers: wire center line size, the serving area of the wire center, and the proportion of lines greater than 12 kilofeet. I have extended this analysis to cover all three sets of costs described above, for both GTE's and U S WEST's wire centers. I have also extended the analysis to the HAI 5.0a costs relied on by Mr. Spinks, and to a second set of BCPM costs that Mr. Denney apparently reviewed but did not utilize.[5] The results of this analysis are presented in Rebuttal Exhibits DGT-4 and DGT-5.

[5]This second set of BCPM costs are found in the file "Additional Data (2).XLS", provided by AT&T in response to a GTE data request.

Rebuttal Exhibit DGT-4 presents the essential information from each regression equation.[6] In each instance, all of the estimated coefficients are of the expected sign and are significantly different than zero at a 95 percent level of confidence or greater. The differences among the estimates are seen in how well the variation in the wire center costs is accounted for by changes in the cost drivers. Two goodness-of-fit measures appear in this exhibit for each equation. The first is the R-squared statistic, based both on the costs in logarithmic form and on the original units of dollars per line.[7] As I explained in my responsive testimony, R-squared measures the proportion of the observed variation in the regression's dependent variable that is accounted for by the regression equation. For the GTE wire centers, the three cost drivers explain more than 90 percent of the variation in the cost estimates produced by GTE's own cost model. This is far more than the comparable value for any of the Hatfield or BCPM estimates. The second measure is the MAPE, or "Mean Absolute Percent Error". This statistic is the average

[6]Note that some U S WEST wire centers have no loops that are greater than 12 kilofeet in length. Since the logarithm of zero is undefined, this variable was not entered in logarithmic form into the U S WEST estimates appearing in Section C of the exhibit. Section B of the exhibit presents comparable estimates using the GTE wire center data, while Section A presents estimates based on the double-log form presented in my responsive testimony. Regardless of which set of GTE regression estimates are used, the conclusion is unchanged -- substantially more variation in the wire center costs produced by GTE's own model is accounted for by changes in the cost drivers than is the variation in any of the Hatfield or BCPM cost estimates.

[7]In terms of evaluating the suitability of the model for deaveraging purposes, the R-squared based on the original units is the appropriate measure. The reason for this is that the logarithmic transformation understates the size of the estimated equations' error on the variable of interest -- loop cost per line.

percent error produced by the regression equation, relative to the dependent variable and without regard to sign. The value for GTE indicates that the three cost drivers predict the GTE wire center cost estimates with an average absolute error of only 5.44 percent. By comparison, the average absolute error for the HM 3.1 cost estimates is in excess of thirty percent.

Rebuttal Exhibit DGT-5 presents a comparison of the regression actual and predicted values in graphical form. The first page of this exhibit corresponds to the five regression equations using GTE wire center data, while the second page corresponds to the four regression equations using U S WEST wire center data. The greater the amount of the variation in each cost model's wire center estimates that is accounted for by the three cost drivers, the more the data points will lie along a straight line. For both Hatfield and BCPM, it is clear that the relationship between the actual and predicted values breaks down as the loop costs increase. By comparison, the relationship is consistent and very nearly exact for the GTE estimates, across all of the wire centers.

Both exhibits DGT-4 and DGT-5 show that for GTE's wire centers, GTE's own cost model produces loop cost estimates that are much more closely related to the three cost drivers than are any of the Hatfield or BCPM cost estimates. Additionally, for

both GTE's and U S WEST's wire centers, whatever relationship that does exist between the cost drivers and the Hatfield and BCPM estimates breaks down as the estimated cost per loop increases. Consequently, neither Hatfield or BCPM can be relied upon as the basis for a deaveraging proposal, and it is clear that GTE's own wire center cost estimates are the best choice upon which to base such a proposal.

Should Deaveraging Occur at the Exchange or Wire Center Level?

Q. PLEASE SUMMARIZE THE TWO BASIC VIEWS ON THE PROPER LEVEL FOR DEAVERAGING.

A. The two basic views are best characterized by the proposals espoused by AT&T and by Staff. AT&T's proposal examines average loop costs at the wire center (or individual switch) level and ranks them from low to high. After an examination of the data, cutoffs between zones are determined and rates are computed based on the average costs for each resulting group of wire centers.[8] In Staff's proposal, wire center costs are aggregated to the exchange level. Oftentimes, the wire center and the exchange are one and the same, particularly in GTE's network. These exchange-level costs are grouped together according to some attribute related to

[8]The fact that AT&T has pooled GTE's and U S WEST's data in developing its proposal, and has failed to explain how the zone cutoffs were determined, is not germane to the discussion of what level of deaveraging should occur. These are still important issues that must be resolved in deciding on the merits of AT&T's proposal.

loop costs -- in Staff's proposal, Mr. Spinks chose density, or lines per square mile, but he could have just as easily chosen the size of the exchange based on the number of lines served.

Both Staff and AT&T are critical of each other's approach to deaveraging loop costs. At page 4 of his responsive testimony, Mr. Spinks claims that AT&T's loop deaveraging proposal does not constitute geographic deaveraging, because Mr. Denney did not examine the costs of wire centers grouped by density or some other attribute.[9] In his January 18th testimony, Mr. Denney criticizes the use of density "as a proxy for cost" and notes that performing the analysis at the exchange level may result in low- and high-cost areas being combined together, limiting the advantages of rate deaveraging. (Denney, pages 18-19).

Q. WHICH OF THESE TWO BASIC VIEWS IS CORRECT?

A. From a strict costing perspective, Mr. Denney is correct. Even though average loop costs are determined by the density of the serving area, other factors play a role as well. As I noted above, Mr. Spinks could have just as plausibly chosen the number of lines served as the basis for his deaveraging proposal. Provided that the cost

[9] In my discussion of Mr. Spinks' responsive testimony below, I explain why this position is incorrect.

model used adequately reflects relative wire center costs, ordering wire centers based on their average loop costs as AT&T proposes will set aside the question of which cost proxy (line size, density or something else) to use.

Q. DOES THIS MEAN THAT THE DEAVERAGING PROPOSALS SHOULD NOT BE CONSTRAINED SO THAT WIRE CENTERS IN THE SAME EXCHANGE ARE IN THE SAME ZONE?

A. No. It is quite clear that rate design is as much an art as it is a science, and that other considerations may make it desirable for wire centers within the same exchange to be grouped into the same deaveraged zones even if these wire centers would otherwise be grouped differently. Fortunately, this is easy to do. If the Commission decides to constrain the deaveraging proposals so that wire centers in the same exchange are in the same zone, I would recommend that the initial zone definitions be based on an examination of costs at the wire center level. If wire centers are moved to another zone in order to satisfy the constraint, all that has to be done is to recalculate the average costs based on the final makeup of the zones. The resulting rates will still be cost-based, and will be geographically deaveraged. Using the data underlying the alternative deaveraging methodology that I presented in my responsive testimony, I have calculated rates that result from imposing this constraint. These rates are shown in Rebuttal Exhibit DGT-6. I have

also shown the rates that result from imposing this constraint on the deaveraged rates in Rebuttal Exhibit DGT-3 that were based on GTE's wire center costs.

Testimony of Douglas Denney

Q. WHAT PORTIONS OF MR. DENNEY'S JANUARY 18TH TESTIMONY DOES YOUR REBUTTAL TESTIMONY ADDRESS?

A. My rebuttal testimony addresses his claim, made at page 4 of his testimony, that the HAI model is a newer version of HM 3.1, and that it produces more accurate loop cost estimates than HM 3.1 due to the improvement in customer location contained in the model. Additionally, I present a comparison of the wire center areas modeled by HM 3.1 with the actual size of each serving area. Finally, I correct a factual misstatement contained in footnote 10 of Mr. Denney's testimony.

Q. IS HAI 5.0a SIMPLY A NEWER VERSION OF HM 3.1?

A. No it is not, particularly with regard to its use in developing deaveraged loop costs. The most significant difference between the two models is that HAI 5.0a uses geocoded residential and business locations to model customer locations, rather than information based on Census Block Groups (CBGs). Additionally, HAI 5.0a bases its estimate of wire center boundaries on census blocks rather than CBGs. It is quite clear that HAI 5.0a is much more than simply "a newer version of HM 3.1".

Q. DO THESE CHANGES IN THE WAY HAI 5.0a MODELS CUSTOMER LOCATIONS AND WIRE CENTER BOUNDARIES MAKE IT SUITABLE FOR USE IN DEVELOPING A DEAVERAGED LOOP COSTS?

A. No, it does not. At first blush, the HAI 5.0a model would appear to be an improvement because it utilizes geocoded data for residential and business customers. However, HAI 5.0a is still flawed, for at least four reasons. First, as I noted above, HAI 5.0a models wire center boundaries based on census blocks. See Rebuttal Exhibit DGT-7, which is taken from the HAI 5.0a model documentation. Like CBGs, census blocks increase in size as one moves away from populated, urban areas to more rural, less densely populated areas. This means that the census blocks at the edge of small, less dense, wire centers will be the largest census blocks associated with the wire center. Of course, it is the census blocks at the edge that determine the model's view of the wire center boundary, so that the problems presented by use of CBGs persist with census blocks, although to a lesser degree.

Second, while HAI 5.0a uses geocoded data as an input, it essentially discards this information when designing local distribution plant. It does this by replacing the irregular convex hull surrounding a cluster of geocoded points with a rectangle with

the same area and aspect ratio as the convex hull. It then assumes that the geocoded locations are evenly spread within this rectangular area. This process is illustrated on the first page of Rebuttal Exhibit DGT-8. The remaining pages of this exhibit are taken from the HAI 5.0a model documentation.

Third, any improvements in customer location through the use of geocoded data can only occur away from densely populated areas. The reason for this is that census blocks in densely populated areas are very small, so that the census block and geocoded line counts will be nearly the same. However, the gains from geocoding are not realized in HAI 5.0a, because the geocoding is not 100 percent successful. For Washington, the overall success rate is 60 percent, and only 29 percent in the least dense areas. Consequently, the HAI model developers "true up" the geocoded line counts to estimates at the census block level, and the line counts by census block and by wire center are unchanged.

Finally, and most serious of all, when the HAI sponsors "true up" the line counts based on the geocoded data to their estimates for each census block in a given wire center, they must generate pseudo geocoded locations. They do this by assuming the additional lines are uniformly spread along the boundary of each census block. (See Rebuttal Exhibit DGT-9 which is again taken from the HAI 5.0a

model documentation.) This has the potential of creating artificial clusters of customers where none exist in reality. Additionally, this approach will likely place some customers at the very edge of the wire center boundary, skewing the loop costs for these customers. This has a direct impact on the model's suitability for deaveraging since the relative costs of the wire centers are consequently skewed as well.[10]

Q. PLEASE DESCRIBE YOUR ANALYSIS OF THE WIRE CENTER AREA MODELED BY HM 3.1.

A. I have compared the serving area modeled by HM 3.1 for each U S WEST and GTE wire center. HM 3.1 models a wire center by associating one or more CBGs with the wire center. Each CBG is divided into four quadrants, each of which has its own feeder and distribution facilities. In computing the area modeled by HM 3.1, I accounted for the fact that HM 3.1 assumes two of the four quadrants are empty when the variable "Fraction Empty" exceeds 50 percent. For GTE, the analysis excludes the three sold wire centers modeled by HM 3.1, as well as the four GTE

[10]There is no easy solution to assigning locations to the shortfall in line counts that geocoding produces. If one adopts some sort of procedure that assigns these pseudo locations on the basis of the actual geocoded data, one runs the risk of overstating the density of customers. The reason for this is that the geocoding process used by the HAI sponsors relies on assigning latitudes and longitudes to street addresses taken from a variety of sources. The shortfall arises because not all customers have street addresses. If the shortfall is overlaid on top of the (ostensibly) known geocoded locations that are derived from street addresses, customers will be placed where they are not located. Consequently, geocoding consists of more sizzle than steak.

wire centers that HM 3.1 overlooks. Additionally, I combined the wire centers listed on page 6 of my responsive testimony.

The result of this analysis is displayed in Rebuttal Exhibit DGT-10. The data in the graphs show the relative error -- expressed as a percent of the actual area -- in HM 3.1's estimate of each wire center's serving area. This measure has been constructed so that positive values represent an overestimation of the area by HM 3.1. The average of the absolute value of the relative error -- the MAPE -- is 215 percent for GTE, and 112 percent for U S WEST. Overall, HM 3.1 overestimates the area served by each company's Washington network by 60 and 88 percent for GTE and U S WEST, respectively.

Q. WHAT FACTUAL MISSTATEMENT HAS MR. DENNEY MADE IN FOOTNOTE 10 OF HIS TESTIMONY?

A. In this footnote, Mr. Denney states that the loop cost model used in this proceeding has been updated and incorporated into GTE's new cost model, ICM, which has been filed in Oregon. Mr. Denney is mistaken -- the loop cost model used in Washington has not been updated and incorporated into any version of ICM, filed or otherwise. Setting this misstatement aside, the inference drawn by Mr. Denney in this footnote depends on the unwarranted assumption that HM 3.1 accurately

estimates loop costs across GTE's wire centers. I have shown above that this is not the case.

Testimony of Michael A. Carnall

Q. WHAT PORTIONS OF MR. CARNALL'S JANUARY 18TH DOES YOUR REBUTTAL TESTIMONY ADDRESS?

A. My rebuttal testimony addresses certain of Mr. Carnall's criticisms of Staff's deaveraging proposal. Specifically, my testimony addresses the comments of Mr. Carnall at page 2 through 5 of his testimony that deal with Mr. Spinks' proposal to deaverage loop costs based on distance.

Q. WHAT IS YOUR UNDERSTANDING OF MR. CARNALL'S MAIN CRITICISMS OF MR. SPINKS' DISTANCE-BASED DEAVERAGING PROPOSAL, AND WHAT IS YOUR POSITION CONCERNING THESE CRITICISMS?

A. Mr. Carnall's main criticisms are that distance and density are not the only determinants of loop costs and that, even though loop costs are determined by loop length, there is not enough information in average loop costs and average loop lengths to estimate a relationship to predict costs for individual loops. The first of these criticisms echoes an argument I made in my responsive testimony at page 23. Because there are other variables that affect loop costs that Mr. Spinks has omitted

from his regression equation, the resulting parameter estimates are biased. Setting all other objections aside, Mr. Spinks' distance-based deaveraging proposal is invalid because it relies on a biased estimate of the loop-length coefficient.

Mr. Carnall's second major criticism is equivalent to my observation that Mr. Spinks is trying "to unscramble an omelet." (Tucek responsive testimony; page 22). No one familiar with local outside plant networks will dispute the claim that loop costs are significantly determined by loop length -- it only makes sense that a 10 kilofoot loop will cost more than a 5 kilofoot loop, other things being equal. The kicker is "other things being equal". If the 10 kilofoot loop were in a 200-pair cable with easy placement conditions and a 90 percent fill, while the 5 kilofoot loop were in a 25-pair cable with difficult placement conditions and only a 20 percent fill, the longer loop might very well cost less. The variation in the "other things" that are *not equal* among loops of a given length is averaged out in the wire center data used by Mr. Spinks for his regression analysis. Consequently, the results cannot be used to calculate costs for individual loops or loops of a given length.

Testimony of William Page Montgomery

Q. HAVE YOU BEEN ABLE TO REVIEW THE WORKPAPERS UNDERLYING MR. MONTGOMERY'S TESTIMONY?

A. Yes, I have. It appears that Mr. Montgomery has started with the workpapers Mr. Spinks provided with his direct testimony. Consequently, Mr. Montgomery has carried forward Mr. Spinks' error with respect to the Juanita wire center that I noted at page 17 of my responsive testimony. Likewise, Mr. Montgomery's more "conservative" distance-based deaveraging proposal relies on Mr. Spinks' original proposal and is consequently subject to all of the flaws that I outlined at pages 21-24 of my responsive testimony. In particular, Mr. Montgomery's proposal still relies on a relationship between average loop length and cost that is based only on U S WEST wire centers and which is not supported by GTE data.

Q. WHAT PORTIONS OF MR. MONTGOMERY'S JANUARY 18TH TESTIMONY DOES YOUR REBUTTAL TESTIMONY ADDRESS?

A. My rebuttal testimony addresses Mr. Montgomery's claim, at pages 4 of his testimony, that each of the four deaveraging proposals presented with the initial round of direct testimony reconcile to the Commission-ordered statewide costs. I also address his claim, at page 6, that Mr. Spinks' analysis demonstrates that distance has a more significant impact on costs than does density. Finally, my testimony responds to Mr. Montgomery's statement, at page 7 of his testimony, that "even if data did not show that distance is an important driver of loop costs overall,

the Commission could still determine that distance-deaveraging had important public interest benefits". (Emphasis deleted).

Q. WHAT IS YOUR POSITION WITH RESPECT TO MR. MONTGOMERY'S CLAIM THAT ALL FOUR OF THE DEAVERAGING PROPOSALS RECONCILE TO THE COMMISSION'S ORDERED STATEWIDE COSTS?

A. Contrary to Mr. Montgomery's statement, all four deaveraging proposals do not reconcile to the Commission's ordered statewide rates. As I demonstrated in my responsive testimony, AT&T's proposal results in a shortfall for GTE and an over-recovery of costs for U S WEST, even when Mr. Denney's view of the size and make up of GTE's and U S WEST's local exchange network in Washington is assumed. Mr. Spinks has made the same observation about AT&T's initial proposal in his responsive testimony. (Spinks, page 5). Finally, in his January 18th testimony Mr. Denney has changed his deaveraging proposal to correct this error. (Denney, footnote 1).

Q. PLEASE COMMENT ON MR. MONTGOMERY'S CLAIM THAT STAFF'S ANALYSIS DEMONSTRATES THAT LENGTH HAS A MORE SIGNIFICANT IMPACT ON COSTS THAN DOES DENSITY.

A. Mr. Montgomery basis this claim on his comparison of the percent changes in Mr. Spinks' costs across density zones, versus the percent changes in Mr. Spinks' costs between the highest and lowest distance bands. Because the change between the highest and lowest distance bands is the greater of the two percent changes, he concludes that distance has a greater effect than density. This logic is flawed, since the results depend on the number of density zones and distance bands in the deaveraging proposal. To see that this is so, one needs only to examine Mr. Montgomery's "collapsed" rate design proposal in his Exhibit WPM-1. For his proposed rates for GTE, the percent change in the overall average rates from Zone A to Zone B is 150 percent, while the percent change from the low to high distance band is 235 and 246 percent for Zone A and Zone B, respectively. Using Mr. Montgomery's logic, one would conclude that distance has a smaller impact than before, even though all that has changed is the structure of the deaveraging proposal. If the distance bands were collapsed into 6,000 foot increments, the spread between the two percent changes that Mr. Montgomery's claim relies on would shrink even further.

Q. PLEASE COMMENT ON MR. MONTGOMERY'S STATEMENT THAT THE COMMISSION COULD STILL FIND THAT DISTANCE DEAVERAGING HAD IMPORTANT PUBLIC INTEREST BENEFITS EVEN IF THE DATA DID NOT

SHOW THAT DISTANCE IS AN IMPORTANT DRIVER OF LOOP COSTS OVERALL.

A. Mr. Montgomery seems to be suggesting that the Commission order a distance-based rate design regardless of what an analysis of the development of such a rate design shows. Such a suggestion is at odds with his prescription that deaveraged rates should track a provider's costs as closely as possible. (Montgomery; page 3). It is also at odds with Mr. Knowles statement that the Act requires unbundled rates to be based on costs. (Knowles; page 2). Mr. Montgomery seems to be basing his recommendation on the rate design he would like to see ordered, rather than on an analysis of the data used to develop the proposal. Any suggestion that the Commission should disregard the data and impose a distance-based rate design should be ignored.

Testimony of Thomas L. Spinks

Q. HAVE YOU BEEN ABLE TO REVIEW THE WORKPAPERS UNDERLYING MR. SPINKS' JANUARY 18TH TESTIMONY?

A. Yes, I have. Mr. Spinks has repeated the error concerning the Juanita wire center contained in his initial deaveraging proposal. Also, the lines he used to develop the two sets of GTE deaveraged rates at page 4 of his responsive testimony do not correspond to the lines used to develop GTE's cost study filing. It appears that Mr.

Spinks has mistakenly used the line counts provided in GTE's response to Staff Data Request Number 6; the correct line counts were provided to Mr. Spinks in response to Staff Data Request Number 9. Finally, nowhere in any of Mr. Spinks' workpapers or testimony is any analysis supporting his claim, made at page 5 of his responsive testimony, that the cost estimates produced by the proxy models are "relatively more accurate."

Q. WHAT PORTIONS OF MR. SPINKS' JANUARY 18TH TESTIMONY DOES YOUR REBUTTAL TESTIMONY ADDRESS?

A. My rebuttal testimony addresses Mr. Spinks' claim, made at page 4 of his testimony, that AT&T's loop deaveraging proposal does not constitute geographic deaveraging. My testimony also addresses his claim, made at page 4 of his testimony, that the model used by GTE does not use detailed geographic information on wire center and customer location relationships in developing loop investments.

Q. PLEASE COMMENT ON MR. SPINKS' CLAIM THAT AT&T'S DEAVERAGING PROPOSAL DOES NOT CONSTITUTE GEOGRAPHIC DEAVERAGING.

A. Mr. Spinks' appears to be suggesting that only a rate design proposal that looks at exchanges or wire centers grouped according to some attribute (such as density) related to loop costs qualifies as geographic deaveraging. This is too narrow a

standard. One could arrange GTE's 99 wire centers in alphabetical order, divide them into groups of 33 and develop rates that were geographically deaveraged. Even though this would likely not be a rational rate design, it would still qualify as geographic deaveraging since the rates charged for an unbundled loop would depend on its location. Alternatively, one could spend resources without limit to determine precisely the differences in loop costs between residential and business subscribers and develop a deaveraged rate proposal based on the class of service of the end user. Regardless of how accurate and comprehensive the analysis was, the latter rate design would not qualify as geographic deaveraging. The reason is that the rates charged for an unbundled loop would depend on the nature of the end user, and not on the location of the loop. AT&T's deaveraging proposal is flawed for many reasons, but not because it does not constitute geographic deaveraging.

Q. PLEASE COMMENT ON MR. SPINKS' CLAIM THAT GTE'S COST MODEL DOES NOT UTILIZE DETAILED GEOGRAPHIC INFORMATION ON WIRE CENTER AND CUSTOMER LOCATION RELATIONSHIPS IN DEVELOPING LOOP INVESTMENTS.

A. Mr. Spinks statement is not correct with respect to GTE's model. As the Company's cost study filing shows, GTE's model relies on the distribution of loop lengths in distance bands in one kilofoot increments, up to 12 kilofeet, with the final band

corresponding to loops greater than 12 kilofeet in length. (See Bates-stamped page 000161.) The main reason that a model needs detailed geographic information is to equip it to model loop lengths accurately. Because GTE's model uses the actual distribution of loop lengths to estimate loop costs, it is necessarily more accurate than a model that must rely on some surrogate measure. Moreover, the alternative deaveraging methodology that I presented in my responsive testimony utilizes the actual loop length distribution of each GTE wire center. This improves the accuracy of GTE's loop cost estimates and provides the wire center detail needed to review a variety of deaveraging proposals.

By comparison, the HM 3.1 model, which is the version of the Hatfield model that is part of the record in this proceeding, relies on Census Blocks Groups (CBGs) as its means of modeling customer location. Reliance on CBGs seriously impacts the model's ability to model loop costs, as I explained in my responsive testimony at page 12, and as the Commission noted in the 8th Supplemental Order at Paragraphs 218 through 222. As I explained above, HAI 5.0a's use of geocoded data does not make the model any more suited for use as the basis for geographic deaveraging.

Q. DO YOU HAVE ANY OTHER COMMENTS CONCERNING MR. SPINKS' JANUARY 18TH TESTIMONY?

A. Yes, I do. In his testimony, Mr. Spinks' has presented an alternative deaveraging proposal based on HM 3.1, the version of the Hatfield model that is in the record in this proceeding. This alternative proposal does not include an update of his proposed rates by distance band, nor does it include an update of his switching proposal. Using the HM 3.1 data, I have re-estimated the regression equation relied on by Mr. Spinks to develop his distance-based deaveraging proposal for loops. Using the HM 3.1 estimates for GTE's wire centers to estimate Mr. Spinks' equation produces an estimate for the coefficient on the average loop length variable that is not statistically significant from zero. Consequently, if HM 3.1 is to be used to develop a distance-based deaveraging proposal similar to that presented in Mr. Spinks' direct testimony, he would still have to rely on an equation based on U S WEST data only. Moreover, the Chow test indicates that parameters for each set of data are not equal -- this is the same result that was obtained with the HAI 5.0a cost data. With respect to HM 3.1 and Mr. Spinks' switching proposal, I reiterate the point made in my responsive testimony -- neither version of the Hatfield model is suited for deaveraging switching costs, and Mr. Spinks' proposal should be set aside for this reason alone.

Q. HAVE YOU PROVIDED THE WORKPAPERS UNDERLYING YOUR ABOVE TESTIMONY?

A. Yes. They are contained on a disk labeled Rebuttal Exhibit DGT-11 which has been filed along with my testimony and other exhibits. This disk contains a self-extracting zipped file called DGTRB_11.EXE. This file unzips into two Lotus spreadsheets. One of these is named CBGAREA.WK4, and contains the data and calculations supporting Rebuttal Exhibit DGT-10. The second file is named DGTRBWPS.WK4, and contains all of the data and calculations supporting the rest of my rebuttal testimony. Both of these files contain confidential data, and should be treated in keeping with the confidentiality agreement of this proceeding.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes, it does.