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OFFICE OF THE SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matters of	)	
	)	
Federal-State Joint Board on Universal Service;	)	CC Docket No. 96-45
	)	
Forward-Looking Mechanism for High Cost Support for Non-Rural LECs	)	CC Docket No. 97-160

REPLY COMMENTS OF BELLSOUTH CORPORATION, QWEST COMMUNICATIONS INC., AND SPRINT CORPORATION

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QWEST COMMUNICATIONS INC., AND SPRINT CORPORATION

BellSouth Corporation ("BellSouth"), Qwest Communications Inc. ("Qwest"), and Sprint Corporation ("Sprint"), collectively the "Joint Commenters," hereby submit their Reply Comments in response to the Comments filed by AT&T Corp. ("AT&T") and WorldCom, Inc. ("WorldCom") regarding changes to the Synthesis Model ("cost model" or "model").

I. INTRODUCTION AND SUMMARY

In their initial Comments, the Joint Commenters expressed support for the conversion of the Turbo-Pascal portions of the model to a more modern programming language, but asserted that conversion to Visual Basic, rather than Delphi, would better meet the Federal Communications Commission's ("Commission") objectives. In addition, the Joint Commenters identified three errors in the current model that should be corrected before the model is used to determine high cost support amounts for 2002.[1]

In contrast, AT&T and WorldCom propose numerous changes to the model, many of which would constitute fundamental modifications in the manner in which the model estimates

[1] Comments of BellSouth Corporation, Qwest Communications Inc., and Sprint Corporation, filed Aug. 13, 2001 ("Joint Comments").

cost. Moreover, most of the "corrections" advocated by AT&T mirror positions that the Commission rejected in the *Tenth Report and Order*.[2] The Joint Commenters do not object to the Commission considering certain of the changes proposed by AT&T and WorldCom that appear, at least in theory, to improve the accuracy of the model. The Commission should reject most of the changes proposed by AT&T and WorldCom, however, because they are beyond the scope of the present inquiry, essentially constitute attempts to reargue decisions in the *Tenth Report and Order*, and otherwise are not warranted.

II. THE JOINT COMMENTERS DO NOT OPPOSE THE COMMISSION'S CONSIDERATION OF CERTAIN CHANGES PROPOSED BY AT&T AND WORLDCOM

AT&T proposes several changes to the model that it describes as "implementation improvements."[3] WorldCom suggests a number of the same changes. At least in theory, some of these changes may be valid corrections to the model. In particular, the Joint Commenters do not object in concept to investigation of the proposed changes regarding the placement of the drop terminal,[4] the sizing and configuration of lots,[5] the sizing of outside plant equipment,[6] and the elimination of inconsistencies in the model's expense modules.[7] The Joint Commenters have not sufficiently analyzed the Turbo-Pascal computer code submitted by AT&T and WorldCom to verify that it accurately implements the changes proposed and does not cause any unintended

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[2] *In the Matter of Federal-State Joint Board on Universal Service; Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, Tenth Report and Order*, 14 FCC Rcd. 20156, 20173 ¶ 36 (1999), *aff'd sub nom., Qwest Corp. v. FCC*, No. 99-9546 (10th Cir. Jul. 31, 2001) ("*Tenth Report and Order*").

[3] AT&T Comments, filed Aug. 13, 2001 at 2-8.

[4] AT&T Comments at 3; WorldCom Comments, filed Aug. 13, 2001 at 2.

[5] AT&T Comments at 3; WorldCom Comments at 3.

[6] AT&T Comments at 4; WorldCom Comments at 5.

[7] AT&T Comments at 6.

consequences in the model. Commission staff should satisfy itself regarding these concerns before adopting any of these changes.

III. THE COMMISSION SHOULD REJECT THE REMAINING CHANGES PROPOSED BY AT&T AND WORLDCOM

AT&T and WorldCom propose numerous additional changes beyond those discussed above. Most of these remaining changes exceed the scope of the present inquiry. In the *Public Notice*, the Common Carrier Bureau ("Bureau") sought comment on the relative advantages of the Delphi version over the Turbo-Pascal version of the model, as well as recommendations concerning improvements to the Delphi version.[8] The *Public Notice* did not suggest that the Commission would be reconsidering fundamental decisions made in adopting the model platform and its inputs. Nevertheless, that is exactly what AT&T and WorldCom are requesting, in a number of instances rehashing matters already decided by the *Tenth Report and Order*. Moreover, even if they were appropriately considered here, these changes would not be warranted.

A. Use of Actual Geocode Data

AT&T argues that the Commission should use actual geocode, rather than surrogate, customer location data in the model.[9] However, the Commission specifically rejected AT&T's position on this issue in the *Tenth Report and Order*, concluding that no source of actual geocode data had been adequately accessible for public review.[10] Although the Commission stated its expectation that a source of accurate and verifiable actual geocode data would be identified at

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[8] Common Carrier Bureau Seeks Comment on Translation of Cost Model to Delphi Computer Language and Announces Posting of Updated Cost Model, *Public Notice*, CC Docket No. 96-45, DA 01-1458 (Comm. Carr. Bur., rel. June 20, 2001) ("*Public Notice*").

[9] AT&T Comments at 8-11.

[10] *Tenth Report and Order*, 14 FCC Rcd. at 20173-74 ¶ 36.

some point in the future for use in the model, AT&T has not identified such a source. As AT&T acknowledges, the Commission rejected use of the geocode data maintained by TNS Telecoms ("TNS", formerly PNR & Associates), because interested parties had not had a sufficient opportunity to review and comment on the accuracy of that data set.[11] Furthermore, the Commission specifically noted the significant conditions and expense in obtaining geocode data from TNS.[12] These concerns continue today. Just two months ago, Qwest inquired of TNS about obtaining access to its geocode data for purposes of analyzing a version of the HAI model submitted in state unbundled network element cost dockets. TNS responded that Qwest could review the data via a remote terminal for a setup charge of $5,000 and a per-day charge of $4,000, subject to a one-day minimum.[13] Such charges contradict AT&T's claim that the Commission's concerns regarding the accessibility of the TNS data are "outdated."[14] Moreover, there continues to be serious questions whether the use of TNS' geocode data set would necessarily lead to more accurate cost estimates, given that it is much less complete in rural areas than urban areas.

The Commission should also reject AT&T's suggestion that incumbent local exchange carriers ("ILEC") should be required to supply geocode or geocodable customer location information for use in the model.[15] In the *Tenth Report and Order*, the Commission denied a similar suggestion by AT&T and WorldCom.[16] Furthermore, such a requirement could result in

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[11] *Id.* at 20175 ¶ 39.

[12] *Id.*

[13] *See* Attachment A, Letter from Charles A. White, TNS Telecoms, to Peter Copeland, Qwest (June 21, 2001) (via e-mail).

[14] *See* AT&T Comments at 10.

[15] *Id.*

[16] *Tenth Report and Order*, 14 FCC Rcd. at 20175 n.87.

the disclosure of very competitively sensitive information, especially to the extent that the information provided identifies the type and quantity of services provided to particular customers. In addition, while BellSouth has geocoded customer location data for certain state proceedings, it has found this an exceedingly difficult and expensive undertaking. As a result, such an approach should be pursued only after serious consideration and is clearly beyond the scope of the present inquiry.

Finally, while the Joint Commenters do not object to investigation of the way in which the model designs plant for multi-tenant buildings,[17] they do not agree with AT&T's contention that the current methodology necessarily overstates the cost of serving such buildings. To the contrary, preliminary test runs by the Joint Commenters indicate that the model significantly understates the cost of certain outside plant components, such as network interface devices, necessary to serve multi-tenant buildings.

B. Structure Sharing Between Feeder and Distribution Facilities

The Commission must reject AT&T's proposal to modify the model to reflect structure sharing between feeder and distribution facilities.[18] While AT&T's proposal may have superficial appeal, it is not consistent with usual practices in the field. As discussed in the attached testimony of James W. Stegeman originally filed with the Georgia Public Service Commission,[19] feeder and distribution cable typically do not share the same structure.[20] This lack of sharing results from a number of factors. First, feeder and distribution plant are typically

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[17] *See* AT&T Comments at 10.

[18] *Id.* at 11.

[19] Attachment B, Rebuttal Testimony of Mr. James W. Stegeman on Behalf of BellSouth Telecommunications, Inc. Before the Georgia Public Service Commission, Docket No. 5825-U, dated Sep. 8, 2000 ("Stegeman Testimony").

[20] *Id.* at 10.

installed at different times, which generally precludes the sharing of trench structure. Second, whereas feeder cable is sometimes placed in an underground conduit, in non-urban areas distribution cable is usually buried or placed on telephone poles for easy access to distribution facilities and less expensive connections to end-user customers.[21] As Mr. Stegeman points out, there would be no cost savings from placing distribution cable in a conduit with feeder cable, if it were necessary to then run the distribution cable back down the street from the manhole in a trench or on poles to serve individual customers, or, alternatively, to increase significantly the number of vaults or manholes along a feeder route.[22] Third, in many instances where aerial distribution plant is placed, the spacing and size of the poles will typically not support the weight of the large copper feeder cables.[23]

The Commission should also reject AT&T's effort to transform the Kansas-specific feeder-distribution sharing input adopted by the Kansas Corporation Commission ("Kansas Commission") into a nationwide input. The basis for the 40 percent reduction in feeder structure and placement costs was highly questionable, even as applied in Kansas.[24] Moreover, there is no

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[21] The Commission has recognized that feeder and distribution cable often utilize different structure by adopting different plant mix ratios for feeder and distribution. *Tenth Report and Order*, 14 FCC Rcd. at 20258-59 ¶¶ 236-40.

[22] Stegeman Testimony at 10.

[23] *Id.* at 11. AT&T's reliance on feeder and distribution structure sharing in the BellSouth model is misplaced. As Mr. Stegeman explains, BellSouth has recognized that its model incorrectly assumed sharing of structure in any instance in which feeder and distribution *shared the same route*. *Id.* at 12-13. It should also be noted that the HAI model supported by AT&T and WorldCom does not assume feeder-distribution sharing of structure.

[24] Sprint, who participated in the Kansas proceeding, strongly disagreed with the decision in that proceeding. As Sprint explained to the Kansas Commission, Sprint's actual buried structure costs, which are higher than the inputs adopted by the Commission, are calculated on a post-sharing basis, including sharing with other entities and any internal cost sharing efficiencies. This means that any internal economies of scale that can be achieved had already been reflected in the base structure cost used by the model. Rebuttal Testimony of John Holmes, *Investigation*

justification for applying such a reduction on a nationwide basis. The Kansas Commission emphasized that the changes it was making to the input values adopted in the *Tenth Report and Order* were being made solely to reflect Kansas-specific conditions.[25] AT&T does not even attempt to explain how the analysis of 14 wire centers in Kansas, even assuming that analysis was correct, can be extrapolated to the thousands of wire centers served by the carriers whose high cost support is determined by the Synthesis Model.[26] As a result, the Commission should summarily reject this proposal.

C. Use of Host/Stand-alone or Remote Switches

The Commission should similarly reject AT&T's suggestion to use some undefined "forward-looking principles," rather than the Local Exchange Routing Guide ("LERG") database, for determining whether a wire center in the model uses a host/stand-alone or remote switch.[27] In the *Tenth Report and Order*, the Commission adopted the use of the LERG, despite AT&T's and WorldCom's objections that such an approach might reflect the use of embedded

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into the Kansas Universal Service Fund (KUSF) Mechanism for the Purpose of Modifying the KUSF and Establishing a Cost-Based Fund, Docket No. 99-GIMT-326-GIT (Nov. 22, 1999).

[25] *Investigation into the Kansas Universal Service Fund (KUSF) Mechanism for the Purpose of Modifying the KUSF and Establishing a Cost-Based Fund,* Docket No. 99-GIMT-326-GIT, Order 16: Determining the Kansas-Specific Inputs to the FCC Cost Proxy Model To Establish a Cost-Based Kansas Universal Service Fund 3 (Kansas Corp. Comm'n 2000) ("In this proceeding, the Commission has adapted the FCC's cost model for Kansas conditions, to ensure that nationally-established values for model variables are modified to fairly reflect relevant distinguishing circumstances in Kansas.").

[26] AT&T's advocacy for a 40 percent reduction in "structure and placement costs in the cost model" is not even supported by the Kansas decision. The Kansas Commission adopted a 40 percent reduction in *feeder* structure and placement to reflect purported sharing in the model between feeder and distribution cable. AT&T's proposal would apply a 40 percent reduction to structure and placement costs for both feeder *and distribution*, thus doubling the impact of such sharing.

[27] AT&T Comments at 12.

technology, pricing, and engineering practices.[28] The Commission found that the LERG was the best source of data available for determining host-remote switch relationships in the model, and particularly more reliable than the approach advocated by AT&T and WorldCom.[29] The Commission emphasized that no other algorithm had been placed on the record to determine whether a wire center should house a stand-alone, host, or remote switch.[30] Nor has AT&T provided such an algorithm with its Comments. The LERG continues to be the best source of data for determining switch relationships. As a result, the Commission should disregard AT&T's proposed change.

D. Structure Sharing Percentages

Once again seeking reconsideration of a decision in the *Tenth Report and Order*, AT&T argues that the Commission should adopt more forward-looking structure sharing percentages.[31] However, AT&T presents no reasonable basis for doing so. If anything, the structure sharing percentages adopted in the *Tenth Report and Order* assumed more sharing than would actually occur in a competitive forward-looking environment. Qwest has examined the fiber optic construction permits for the first half of 2001 for one of the most competitive areas in its in-region territory along 17th Street in downtown Denver. The permit records show that while multiple competitive local exchange carriers installed fiber optic cable along this corridor during this period, some at the same time, sharing did not occur. Clearly the opportunity to share exists, but these carriers did not choose to do so.[32]

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[28] *Tenth Report and Order*, 14 FCC Rcd. at 20292-93 ¶ 322.

[29] *Id.* at 20293 ¶ 323.

[30] *Id.*

[31] AT&T Comments at 14-15.

[32] Even AT&T has recognized that city ordinances requiring structure sharing are problematic and may not work in practice. In the article cited by AT&T regarding cities that have required

The Joint Commenters consider input issues such as structure sharing to be beyond the scope of the present inquiry. However, if the Commission were to consider structure sharing, the evidence would suggest that the *Tenth Report and Order* overestimated the amount of sharing. Furthermore, in adopting the current sharing percentages, the Commission already considered, and factored in, AT&T's and WorldCom's arguments regarding forward-looking practices.[33]

E. Distribution Plant Mix

The Commission should also refuse AT&T's attempt to reargue the estimates for distribution plant mix used in the model. In adopting those percentages, the Commission rejected a number of the assumptions underlying the plant mix percentages proposed by AT&T and WorldCom.[34] The Commission also recognized that the nationwide averages it was adopting would not necessarily reflect the percentage of plant types deployed by particular companies.[35] Thus, the fact that BellSouth may have reported plant mix percentages that are different than those used in the model is not a reasonable basis for modifying these inputs, even if this issue were properly within the scope of the current inquiry, which it is not.

F. Prices for Underground Cable

The Commission also should reject AT&T's effort to revise the price estimates in the model for underground cable. This represents merely another instance of AT&T rehashing

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structure sharing (AT&T Comments at 14 n. 21), carriers expressed concern over such policies because "the odds that all interested carriers will agree on the exact location of a trench are slim, since most extend fiber when customers order it." *Can You Dig It?*, Interactive Week, at 2 (Feb. 14, 2001). According to AT&T spokesman Dave Johnson, to lay fiber in a city's designated area, just in case it might be needed in the future, is "inefficient business." *Id.*

[33] *Tenth Report and Order*, 14 FCC Rcd. at 20262 ¶ 247. The percentages adopted by the Commission were significantly more aggressive than the percentages generally advocated by ILECs. *Id.*

[34] *Id.* at 20258-59 ¶¶ 237-38.

[35] *Id.* at 20259 ¶ 238.

arguments that the Commission rejected in the *Tenth Report and Order*. The Commission need not, and should not, consider this settled issue again.

G. Updated Prices for Digital Loop Carrier Equipment

The Commission should similarly ignore AT&T's effort to revive its proposed price estimates for digital loop carrier ("DLC") equipment, which the Commission rejected in the *Tenth Report and Order*.[36] In that *Order*, the Commission disagreed with AT&T's and WorldCom's analysis of the contract data used to derive the DLC price estimates adopted by the Commission.[37] AT&T has presented no new evidence to undermine the Commission's decision in the *Tenth Report and Order*.

H. Distribution of Residual Lines

The Joint Commenters disagree with AT&T's proposed change to address the issue of "residual lines," which arises from the model's use of fractional line counts. As discussed in the Stegeman Testimony, while the suggested fix may address the residual line issue raised by AT&T and WorldCom, there is no attempt to preserve data points.[38] If the line correction value in the HCPM is negative, then it is possible that microgrids with single lines will be inappropriately removed. Verizon (formerly GTE) has also identified problems with AT&T's proposed solution, and has provided a more appropriate alternative.[39]

I. Determination of Cable Routes

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[36] *Id.* at 20275-76 ¶¶ 278-81.

[37] *Id.*

[38] Stegeman Testimony at 8.

[39] *See* Letter from W. Scott Randolph, GTE, to Magalie Roman-Salas, FCC, at 2-3, dated Apr. 14, 2000 ("*GTE Letter*").

The Commission should also decline to adopt AT&T's and WorldCom's suggestion to use distance criteria, not cost criteria, to determine cable routes.[40] Implementing this change, without recognizing the routing that must occur in the network, may lead to no better an estimate of costs than through use of the current algorithm.[41]

J. Overlapping Microgrids

The Commission should reject AT&T's proposed change to address overlapping microgrids.[42] As pointed out by Verizon, AT&T's proposed solution would introduce problems that are far worse than the issue that it tries to remedy.[43]

The long list of proposed changes discussed above sharply contrasts with the three implementation errors that the Joint Commenters identified in their initial Comments. Specifically, the Joint Commenters suggested that the Commission should eliminate the inconsistency in the computation of special access lines in the HCPM and HAI portions of the model;[44] fix the model's sizing of serving area interfaces;[45] and address the inconsistency caused by updating line count data without also updating road data and customer location data used in the model.[46] All three changes are necessary to ensure that the model operates as intended and therefore should be implemented before using the model to determine universal service support for non-rural carriers for 2002.

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[40] AT&T Comments at 6-7; WorldCom Comments at 4.

[41] Stegeman Testimony at 9.

[42] *See* AT&T Comments at 7-8. *See also* WorldCom Comments at 2-3.

[43] *GTE Letter* at 1-2.

[44] Joint Comments at 7.

[45] *Id.* at 8-9. In fact, AT&T and WorldCom both recognize that the model uses some outside plant equipment that is too small and thereby understates costs. *See* AT&T Comments at 4; WorldCom Comments at 5.

[46] Joint Comments at 10.

IV. CONCLUSION

For the reasons discussed above and in the Joint Comments, the Commission should adopt the positions advocated by the Joint Commenters.

Respectfully submitted,

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August 27, 2001

ATTACHMENT A

REBUTTAL TESTIMONY OF MR. JAMES W. STEGEMAN
ON BEHALF OF BELLSOUTH TELECOMMUNICATIONS, INC.
BEFORE THE GEORGIA PUBLIC SERVICE COMMISSION
DOCKET NO. 5825-U
September 8, 2000

FILE COPY

INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS AFFILIATION.

A. My name is James W. Stegeman. I am the President of CostQuest Associates, Inc. I am testifying on behalf of BellSouth Telecommunications ("BST", "BellSouth", or the "Company").

Q. ARE YOU THE SAME JAMES W. STEGEMAN WHO FILED DIRECT TESTIMONY IN THE PROCEEDING ON AUGUST 1, 2000?

A. Yes. In that testimony I described my relevant training, experience, and education.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to address the HCPM modifications proposed as part of the direct testimony of Mr. John C. Donovan and Mr. Brian F. Pitkin

(testifying on behalf of AT&T and WorldCom). Daonne Caldwell will address the specific values for the input changes recommended by Mr.Donovan and Mr. Pitkin. For convenience, I will sometimes refer to Mr. Donovan and Mr. Pitkin as "D&P".

Q. D&P SPEND A GREAT DEAL OF TIME DISCUSSING "CORRECTIONS" TO THE SYNTHESIS MODEL. ARE YOU SURPRISED BY THE NUMBER AND IMPACT OF THE CHANGES

A. Yes. It is difficult to believe that the FCC's HCPM model overstates the subsidy requirements of Georgia by over 50% as suggested by D&P. This is a national model being used by many states and by the FCC for determining the required level of universal service funding. It would seem that if the model's costs were as overstated as suggested by D&P that the FCC would implement fixes as quickly as possible. However, this is not the case. At page 13, D&P note that their proposed changes were discussed with the FCC Staff in February. The FCC, however, has not implemented any of these changes. Indeed, in checking with the staff of the FCC, they have not yet even determined whether any of the changes should be implemented.

In my direct testimony of August 1, I discussed five key limitations of the SM. My discussion was designed in part to suggest that in the future, certain changes should be considered to the SM. My discussion of these limitations

was also intended to stress caution in making changes to inputs or changes to source code that could lead to inconsistencies with other parts of the model. I also suggested that a benefit of the model is that it could be a standard platform that could allow parties to focus attention to setting inputs correctly rather than arguing the methods of the model. Under my approach, only inputs were modified to address limitations. D&P has taken a different approach and testified that the code of the model should be modified now. First, this leads to questions such as, who will implement, test and verify the code changes? Once the code is modified, who will maintain the Georgia model?

More importantly, their proposal represents a fundamentally different approach to the model. I have proposed to generally accept the model (for now, at least) without code changes. I did address some model issues with input changes, but I otherwise accepted the FCC's version of the model as a starting point. I still believe that this is an appropriate approach. However, if the Commission is inclined to consider modifying the model code more drastically, as advocated by D&P, then it is extremely important to be certain that ***all*** appropriate modifications are made. While D&P have offered some modifications that I will discuss below, there are several important modifications which they have failed to mention. I will discuss these below, as well.

Q. CAN YOU EXPAND ON YOUR CONCERN ABOUT CODE MODIFICATIONS?

A. The short span of time allowed for studying the D&P modifications hardly allows enough time for unit testing let alone understanding the implications of the code change at a statewide level.

For example, a code change may appear logically correct within the confines of a particular unit or module. However, within the scope of our testing, we have little certainty that any particular "small" change will have an impact limited only to this one area. D&P propose a change to the node attachment algorithm. Within the set of input values modified for this proceeding, the code modifications might appear to operate correctly. If a new set of input values is later tested, it is quite conceivable that the model, with this modified attachment algorithm, may not work or may calculate incorrectly. One of the most significant disadvantages to any code modification, at this point, is that it will create a model unique to this one proceeding and set of inputs. The benefit of the Synthesis Model's stability and public scrutiny is therefore eliminated.

Q. HAVE YOU BEEN ABLE TO VERIFY WHETHER D&P'S SUGGESTED CODE CHANGES ARE INDEED CORRECT?

1 A. Given that my team has had only a few weeks to open up the HCPM code and
2 investigate the proposed modifications, it has been difficult to verify each and
3 every change and the interaction of the changes with other portions of the
4 model. It does appear that some of the errors pointed out by D&P are valid
5 (some with modifications). Yet, a few are inappropriate. On balance, I am
6 concerned that the FCC has not responded to these recommendations. And, I
7 am concerned that, while D&P may be fixing piece parts of a model that
8 abstracts the customer locations and the rectilinear routes needed to connect
9 these customers, the modified model may be getting no closer to the real cost
10 of providing service to actual customer locations following routes constrained
11 by rights-of-way. Even if one assumes that modifications are indeed valid, the
12 changes need to be addressed in concert with all other noted model
13 shortcomings and in the context of real locations and routing. I noted some of
14 these shortcomings in my direct testimony.
15
16 **Q. CAN YOU PROVIDE COMMENTS ON YOUR REVIEW OF THE**
17 **HCPM AND D&P'S SUGGESTED CHANGES?**
18
19 A. Yes. In the paragraphs to follow, I will review each of D&P suggested
20 changes. I will also expand on some of my previously noted shortcomings of
21 the HCPM and on other deficiencies of the model that were discovered in our
22 limited code review. Finally, I will review the appropriate road multiplier
23 factor that is intended to provide a result closer to reality.

Q. PLEASE REVIEW YOUR FINDINGS ON D&P'S ITEM 1: DROP TERMINAL DISPERSION.

A. While the suggested fix appears correct in regard to this section of the HCPM, the code provided by D&P would not compile. We had to modify line 533. We assumed that the extra special characters were clerical errors rather than a term missing from the statement.

D&P Code

```
y^[n]:=GR^.LowerLeftY + (row-1)*GR^.MicroGridNS+j*()*GR^.MicroGridNS /NS)lots);
```

Modified Code

```
y^[n]:=GR^.LowerLeftY + (row-1)*GR^.MicroGridNS+j*(GR^.MicroGridNS /NS)lots);
```

Q. PLEASE REVIEW YOUR FINDINGS ON D&P'S ITEM 2: DROP TERMINAL ORIENTATION.

A. While the suggested fix appears correct in regard to this section of the HCPM, it is not clear whether the fix for this issue should also incorporate Item 1 (Item 1 and 2 affect the same section of code). In D&P's proposed code, Item 2 does not include the fixes listed in Item 1. In other words, as the change is implemented it would seem to re-create the problem addressed in Item 1.

Q. PLEASE REVIEW YOUR FINDINGS ON D&P'S ITEM 3: LOT SIZE / CONFIGURATION.

A. The suggested fix appears correct in regard to this section of the HCPM. However, we could not replicate the level of change. When we implemented the code provided by D&P, the distribution route distance increases over 1.5%, not the 0.4% noted by D&P.

Q. PLEASE REVIEW YOUR FINDINGS ON D&P'S ITEM 4: INPUT VARIABLES.

A. The suggested fixes to the Globals.pas and Structur.pas appear correct in regard to this section of the HCPM. However, I do not believe the suggested code fixes for Terminal.pas and Tech.pas are complete. Tech.pas does not size the FDI for the correct Distribution and Feeder cable sizes. Similar to the problem noted by D&P in line 146, the lookup for the correct cables sizes should increment in the same manner. As the code stands now, cable sizes used to size the FDI are insufficient for the actual demand. I have attached the suggested code change in Exhibit JWS-1. The Terminal.pas code would be correct if the Drop terminal input table were constructed correctly. The lookup value from the HCPM is the number of distribution pairs. The Drop terminal inputs for sizes 25 and under refer to the number of distribution pairs that can be connected. However, the Drop terminal sizes above 25 refer to the

distribution and feeder pairs that are connected (commonly referred to as the "in" and "out" pairs). While it would be possible to correct the Input table, I am concerned that the user will be confused as to which size cable a price should be associated with. Instead, we instituted a code change that recognizes both the "in" and "out" pairs for Drop terminals above a 25 pair terminal size. The modified code is provided in Exhibit JWS-2.

Q. PLEASE REVIEW YOUR FINDINGS ON D&P'S ITEM 5: RESIDUAL LINE ALLOCATION.

A. While the suggested fix appears to address the residual line problem, there is no attempt to preserve data points. If the line correction value in the HCPM is negative, then it is possible that microgrids with single lines will be removed using D&P's code. If these data points actually represent customers, then they should not be discarded. Typically, these single customer microgrids are the "long haul" customers that incur higher costs. We have modified the code so that, if possible, no microgrids are discarded. The modified code is provided in Exhibit JWS-3.

Q. PLEASE REVIEW YOUR FINDINGS ON D&P'S ITEM 6: NODE SELECTION CRITERIA.

A. While I agree that D&P's minimization of distance seems to create a lower cost network (based on current inputs), I am concerned that implementing this change, without recognizing the routing that must occur in the network, may lead to a result no closer to the correct costs. I will address the issue of the need for a route adjustment factor later in this testimony.

Q. PLEASE REVIEW YOUR FINDINGS ON D&P'S ITEM 7: OVERLAPPING MICROGRIDS.

A. The suggested fix appears correct in regard to this section of the HCPM.

Q. PLEASE REVIEW YOUR FINDINGS ON D&P'S ITEM 8: DISTRIBUTION / FEEDER SHARING.

A. I do not agree with the arguments made by D&P in regards to feeder and distribution structure sharing. I also disagree with the suggested adjustment to the road multiplier factor.

Q. AT PAGE 21, D&P DISCUSS THE POTENTIAL FOR FEEDER AND DISTRIBUTION CABLE TO SHARE THE SAME STRUCTURE. BASED ON YOUR KNOWLEDGE, DO FEEDER AND DISTRIBUTION CABLE ALWAYS SHARE THE SAME STRUCTURE IF THEY SHARE THE SAME ROUTE?

1 A. No. While it may be the case that feeder and distribution sometimes run along
2 the same route, I do not believe that feeder and distribution cable typically
3 share the same structure[1]. This lack of sharing results from a number of
4 factors. First, feeder and distribution plant are typically installed at different
5 times. This difference in timing generally precludes the sharing of trench
6 structure. Second, as noted by D&P on page 26, "Copper distribution cable is
7 predominately placed on aerial pole lines or is buried". This corresponds to
8 my understanding that when underground feeder is placed there is typically
9 aerial or buried distribution to service the customers. This design allows easy
10 access to the distribution facilities and results in less expensive connections to
11 the customers. Also keep in mind that conduit is generally only accessible at
12 manholes and vaults. There would be no cost savings to running distribution
13 cable in a conduit with feeder cable, only to run it back down the street from
14 the manhole in a trench or on poles to serve individual customers. Nor would
15 there be any cost advantage to significantly increasing the number of vaults or
16 manholes along a feeder route, and incurring additional costs to run
17 distribution cable across major thoroughfares, in order to allow distribution
18 cable to share the feeder structure. An exception to the use of underground
19 distribution cable is in dense, urban environments where underground facilities
20 are more convenient or are the only facilities allowed or practical. Even in
21 urban areas, the portion of underground plant that is distribution is minimal as
22 feeder often terminates in the basement of the building.

[1] Although I am not an engineer, the engineers with whom I have consulted on this point, including Ms.

Third, in many instances where aerial distribution plant is placed, the spacing and size of the poles will typically not support the weight of the large copper feeder cables. If the cables are placed on the aerial facilities, larger poles are used that are placed closer together (a fact not recognized in any input change recommended by D&P.). Limitations on pole size and cable spacing are exacerbated if poles are shared with other providers (e.g., electric power).

Q. AT PAGE 22, D&P STATE THAT IN BELLSOUTH'S TELECOMMUNICATIONS COST MODEL PRESENTED IN FLORIDA "THE FEEDER AND DISTRIBTUION FACILITIES SHARE ABOUT 13% OF THE TOTAL ROUTE DISTANCE." HAVE D&P ACCURATELY CHARACTERIZED THE MODEL RESULTS THAT BST FILED IN FLORIDA?

A. No. BellSouth did <u>not</u> use the Florida filed loop model to develop structure costs. Instead, BST developed structure factors based on BST's actual books. These factors were then applied to the material dollars generated by the filed loop model to arrive at the structure cost in Florida. In addition, while the model may show that a percentage of the distribution and feeder routes are shared, it does not imply that BST filed results for which all structure is shared

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Caldwell, uniformly agree with my belief.

along any shared route. The use of the factor approach captures the reality of what is shared.

Q. RECOGNIZING THAT BST USED ITS BOOKS TO DEVELOP FACTORS FOR STRUCTURE COSTS RATHER THAN RELYING ON THE FLORIDA FILED LOOP MODEL, DO YOU HAVE ANY OTHER COMMENTS REGARDING D&P'S CLAIMS ABOUT STRUCTURE SHARING?

A. Yes, I have four comments. First, D&P calculated the sharing percentage outside of the filed loop model. Their calculation was based on a formula I provided that I now believe has an error. My original formula leads to the double counting of routes where feeder copper and feeder optical fiber are on the same path. This double counting will lead to an overstatement of the shared route miles.

Second, as I stated in the Florida model filing, structure costs were developed outside of the model, and therefore any peculiarities in the model for structure costs were not carefully examined. However, it now is obvious that the Florida model has the effect of sharing structure in any instance in which feeder and distribution share the same route. This approach is wrong and is being modified in the BellSouth model to capture the sharing facts addressed above. The modifications will incorporate:

- As noted, very little of underground feeder is shared with distribution.
- Where aerial plant is placed adjustments need to be made to install larger poles closer together. Or alternatively, these large copper cables should be buried or placed underground
- A percentage sharing input will be created to allow the user to specify what portion of the shared feeder and distribution route should share structure. This will exclude the first two items above.

As discussed, this modeling error is not a problem for the BellSouth Florida filing due to the fact that structure costs were developed outside of the model, but it could lead to improper conclusions if one were to rely on the current Florida model to develop structure costs.

Q. WHAT ARE YOUR THIRD AND FOURTH COMMENTS REGARDING D&P'S STATEMENTS ON STRUCTURE SHARING?

A. Third, even if one were to apply the sharing percentage D&P developed from the Florida model, the application of the sharing percentage leads to a bias. D&P developed the sharing percentage using the following formula based upon output from the BellSouth Florida model.

- Sharing % = Shared Route / (Total Route accounting for Shared)

Or

- 12.94% = 5,835 / 45,082

D&P then imply that this could be applied against the route mileage from the HCPM. However, the HCPM total route mileage double counts the shared routes of Feeder and Distribution. By applying the "D&P" factor, the shared portion of the HCPM is being reduced twice, not once. A more mathematically correct approach would be to adjust the Florida BellSouth model percentage is as follows

- Sharing % = Shared Route / (Total Route + Shared Routed)

Or

- 11.4% = 5,835 / (45,082 + 5,835)

Fourth, while the existing (uncorrected version of the) BellSouth Florida model implies that route sharing takes place, it is inappropriate to use assumed values from it and apply them to other models without recognition of the fundamental differences in the models. The Florida model utilizes roads to create minimum spanning road trees. These trees represent the most accurate estimate of how routes will typically run. The HCPM, on the other hand, routes rectilinearly. This leads to a mis-statement of the routing that must be incurred on a going forward basis to reflect rights-of-way constraints. To utilize a factor from a Florida model on an already biased HCPM estimate could lead to either greater or lesser bias.

Q. CAN STRUCTURE SHARING OCCUR ON A ROUTE THAT HAS BOTH FEEDER AND DISTRIBUTION?

A. Certainly, however, I do not believe that sharing takes place to the extent recommended by D&P[2]. For underground and aerial structure, such sharing may occur when the type of structure coincides and the economics of placement dictate sharing. With buried structure, timing of placement also becomes a factor. As I mentioned previously, it is my understanding that: a) sharing will rarely occur with underground feeder, b) sharing will rarely occur on aerial structure for copper feeder without adjustments to the pole size and spacing, and c) sharing can only occur in buried plant when the feeder and distribution facilities are being placed at the same time. Recognizing these limitations and the fact that D&P's use of the BellSouth Florida sharing percentage is flawed, I believe D&P's unsupported 10% is a gross overstatement of the true value of shared structure.

Q. D&P STATE, AT PAGE 22, IN SECTION III.8 ENTITLED "FEEDER/DISTRIBUTION SHARING", THAT THEY HAVE "REDUCED THE ROUTE MILES <u>AND</u> STRUCTURE COSTS BY 10%." (EMPHASIS ADDED). DO YOU HAVE ANY COMMENTS?

A. Yes. In addition to the fact that I believe the 10% is overstated, if the intent is to reflect a phenomenon of 10% of feeder structure being shared with distribution cable, then D&P have clearly over adjusted for at least two

[2] Again, I have confirmed this with a number of engineers, including Ms. Caldwell.

reasons. First, the reduction of route miles leads to more than a reduction in structure costs. Reducing total route distance by 10% will not only reduce structure distance (and structure cost), it will also reduce cable distance (and cable costs) and other related network costs.

Second, the reduction of both route miles and structure costs leads to a double reduction in structure costs (once indirectly through a reduction in route miles, then again through an explicit reduction in structure costs). As noted above, the total effect is more than double counting since cable costs and other network costs are also reduced.

Q. D&P REFERENCE A KANSAS ORDER AS SUPPORT FOR THE REDUCTION IN STRUCTURE COSTS. DO YOU HAVE ANY COMMENTS?

A. Yes. It is interesting that D&P state "the Kansas Corporation Commission reduced the distribution distance produced by the model by 15%." This would support a reduction (in Kansas) in distribution, not a reduction in distribution and feeder distance as recommended by D&P. Second, in reviewing Table 1 on page 12 of D&P's testimony, it appears that D&P have reduced the distribution distance by 28.5%, not 15%. D&P provide no specific justification in this proceeding for a reduction in the distribution distance of

28.5%. In particular, D&P provide no specific justification for such an adjustment in Georgia.

Q. ARE THERE ANY OBVIOUS SHORTCOMINGS OF THE HCPM THAT D&P FAILED TO MENTION?

A. Yes. I will cover three additional shortcomings. First, as I mentioned in my direct testimony, the HCPM's use of Special Access derived channel equivalents will lead to biased results. Second, the HCPM engineers all customer lots in the same manner. The lack of recognition for larger cables and terminal equipment at multiple line lots will lead to biased results. And third, the use of rectilinear routing may mis-state the required routing.

Q. IN REGARDS TO YOUR FIRST SHORTCOMING, YOUR DIRECT TESTIMONY NOTED A CONCERN IN THE SM'S USE OF DERIVED SPECIAL ACCESS CHANNELS. DID D&P SUGGEST A CHANGE TO CORRECT THIS PROBLEM?

A. No. I note in my direct testimony (beginning at page 16) that the use of derived channels creates two types of distortions that lead to an overestimate of special access lines of 696.4% and an understatement of BellSouth's universal service funding needs. With DS1 and higher levels of multiplexing, the SM "derives" a higher count of DS0s as if each of these channels were actually

served on a dedicated copper pair. The HAI portion of the SM derives per loop cost by dividing the total investment columns by the total lines, including derived channels. In so doing, the SM is spreading the costs of a largely copper-pair-POTS network across a count of lines that includes electronically derived channels that are not used by POTS customers. In addition, by using the ARMIS value, services are being modeled that don't even use the public switched networked (e.g., some DS1s, DS3s, OC1s, etc.).

Without correcting for this problem, D&P have understated BellSouth's universal service costs and the resulting subsidy.

Q. CAN YOU EXPAND ON THE ISSUE OF DROP ENGINEERING?

A. The HCPM engineers all customer locations in the same manner (i.e., 1-2 pair NID and 2-5 pair drop cable) even though almost 5% of the PNR records (Customer Location Data) show lots with 5 or more lines. The model should install building terminals and larger copper cables at these multi-line locations. And in certain circumstances, the model should place intrabuilding cable. To implement a code fix to address this error would be impossible in the time available. However it is possible to implement input changes that minimize this problem. In Exhibit JWS-4, I have provided the changes to the drop cable and NID inputs. The drop cable input was derived by weighting together the estimated cable cost at each lot. For NIDs, we looked at the cost differential

between the BST filed input and the actual NID cost that would be incurred at each location. We excluded the lots with over 5 lines, assuming that a building terminal would be installed at the site. We could not, however, address the issue of intrabuilding cable and the need for building terminals on site in the current construction of the HCPM. This issue should be investigated further as time permits.

The results of my analysis indicate that the NID input should be increased by $3.98 per NID. For drop cable, the input should be changed from BST's input of $318/1000ft to $493/1000ft.

Q. CAN YOU EXPAND ON THE ISSUE OF USING RECTILINEAR DISTANCES?

A. D&P fail to address the biased introduced with the use of rectilinear distances. While D&P mention the sharing of routes and reductions to the distribution routing, they fail to recognize that the HCPM routing is biased due to the fact that it fails to address the routes the cable must follow (i.e., rights of way on or near roads). The result of their modifications is that they have attempted to adjust a biased number. It is unclear whether the adjustments accentuate or reduce the bias from the true forward-looking cable route requirements.

Before any of their adjustments can be considered, one must concurrently recognize the routing adjustment needed in the HCPM. The ideal approach would be to incorporate road routing in the HCPM. However, there is not enough time or data in this proceeding to accomplish this task. Instead, it is possible to develop a statewide route adjustment factor to recognize the adjustment needed to bring the HCPM route distances in line with the roads they must follow. As I stated in my direct testimony (footnote 8, page 21) "while I have not conducted a formal study for Georgia, based on my experience, I believe the average road multiplier is probably closer to 1.10 to 1.20 rather than the .95 to 1.05 that the FCC reports.

Q. HAVE YOU BEEN ABLE TO DETERMINE AND SUPPORT A VALUE THAT SHOULD BE USED FOR THE ROAD FACTORS IN THIS PROCEEDING?

A. Yes. We selected 10 Georgia wire centers at random. (Due to time constraints we were only able to analyze a limited selection of data in Georgia.) For these 10 wire centers, we obtained the resulting cluster data from a run of the HCPM. For the cluster data in each of the 10 wire centers, we compared the sum of the rectilinear distances from each Drop Terminal back to its corresponding SAI compared to the sum of the road distances from those same Drop Terminals back to their corresponding SAIs. This comparison provides an estimate of the difference in using the road routing between points (i.e.,