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January 4, 2002

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Magalie R. Salas, Esq.
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: CC Docket Nos. 00-218 & 00-251
In the Matter of Petition of AT&T Communications of Virginia, Inc., TCG Virginia, Inc., ACC National Telecom Corp., MediaOne of Virginia and MediaOne Telecommunications of Virginia, Inc. for Arbitration of an Interconnection Agreement With Verizon Virginia, Inc. Pursuant to Section 252(e)(5) of the Telecommunications Act of 1996

In the Matter of Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the CC Docket No. 00-218 Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration

Dear Ms. Salas:

Enclosed for your files please find an original and three (3) copies of the public version of the second set of AT&T and WorldCom's responses to Commission staff record requests. A proprietary version of these responses was originally filed on December 21, 2001. Please note that the CD-ROMs referred to in some of the responses were supplied with the proprietary version filed on December 21.

Thank you for your consideration in this matter.

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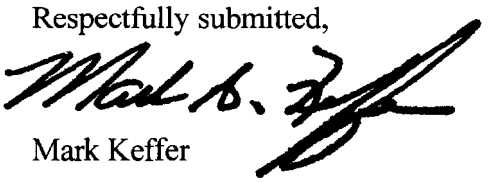
Respectfully submitted,



Mark Keffer

cc: Dorothy Attwood (8 paper copies)
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Katherine Farroba
Counsel of Record
Catherine Ronis

AT&T/WCOM Response to Record Requests

Date	No.	Page	Description
11-28-01	8	5322	Please submit the study that is the basis of the per-line default value for the analog line circuit offset for DLC lines, *i.e.*, the credit for DLC equipment, in the HAI switching and transport module.

AT&T/WCOM Response:

The documents supporting the per-line default value for the analog line circuit offset for DLC lines are attached.

11101.99_07_23_ATT_ and_MCI_Com...

AT&T Reply to Oppositions.pdf

exparte.pdf

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter 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

COMMENTS OF AT&T CORP. AND
MCI WORLDCOM, INC.

*****PUBLIC VERSION*****

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July 23, 1999

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SUMMARY

AT&T and MCI WorldCom agree with the majority of tentative conclusions reached in the Commission's *Further Notice*, and believe that those conclusions are fully supported by the record in this proceeding. As described below, however, a minority of the tentative conclusions are misguided in significant ways, and, if adopted, would result in universal service cost estimates inconsistent with the Commission's own forward-looking principles.

Part I of these comments addresses input values for customer locations. The Commission should not, even as an interim measure, locate customers exclusively by road surrogate algorithms. If the Commission does use 100 percent road surrogate data as an interim measure, AT&T and MCI WorldCom recommend use of the PNR road surrogating algorithm, with an appropriate downward adjustment for its distance inflation. The Commission should likewise follow its tentative conclusion to use the PNR methodology to estimate the number of customer locations and the demand for service at each location, and to allocate customer locations to wire centers.

Part II addresses outside plant input values:

Copper and fiber cable engineering assumptions and optimizing routines. First, given the importance of correct funding for universal service and the proven benefits of optimization, the synthesis model should be run with full optimization, or, at an absolute minimum, at an optimization factor of at least –p850. Second, AT&T and MCI WorldCom support the tentative conclusion not to use the T-1 feeder option in the current version of the synthesis model, but encourage the Commission to use T-1 for certain loop distribution purposes on a going-forward basis. Third, AT&T and MCI WorldCom support the use of rectilinear distance with a 1.0 road factor, rather than airline distance, in calculating outside plant distances.

Costs for copper cable. AT&T and MCI WorldCom support the adoption of separate input values for aerial, underground, and buried cable costs, but oppose the specific input values that the Commission has proposed. Those NRRI/Huber values are based on unrepresentative data and a defective methodology, and thus must be modified, as described in these comments, to comply with forward-looking principles. Even if the Commission adopts the NRRI/Huber approach, however, it should reject the proposed 9.4 percent loading factor for splicing costs. AT&T and MCI WorldCom also oppose the tentative decision to reject the relative weight methodology for estimating the cost of 26-gauge cable. Opponents of that approach have offered no credible evidence to undermine its validity; indeed, their own data confirm its legitimacy.

Buying power adjustments for buried copper and fiber cable. AT&T and MCI WorldCom oppose the Commission's tentative conclusion with respect to the buying power adjustment for buried copper and fiber cable. Instead of basing this adjustment on the lower of the aerial and underground figures, the Commission should base it on the higher of the two figures.

Cable fill factors. As explained below, AT&T and MCI WorldCom believe that the Commission's tentative fill factor determinations are too low.

Structure costs. The proposed values for structure costs fail to reflect the adjustment for non-rural LEC buying power that the Commission applied to copper and fiber cable costs, even though all of these costs are based on the same rural LEC data source. This oversight should be corrected.

Underground structure costs. The proposed underground distribution structure costs are inflated by the improper inclusion of costs for large, prefabricated concrete

manholes that are inappropriate for copper distribution cables beyond a feeder distribution interface.

Distribution plant mix. The Commission's proposal to use non-zero underground copper distribution cable percentages in low density areas and underground percentages as high as 90 percent in dense areas cannot be reconciled with economic engineering practices or with the empirical data submitted by BellSouth showing that the *maximum* percentage of underground distribution plant in any of its 9 states was 2 percent.

Structure Sharing. The proposed structure sharing percentages assign far too great a share of structure costs to the LEC, especially in low density zones. The record confirms that significant sharing opportunities currently exist in all density zones for all three structure types, and are becoming increasingly available and obligatory due to advances in technology and changes in the regulatory environment.

Digital loop carrier costs. The proposed digital loop carrier ("DLC") costs are significantly overstated – as confirmed by the incumbent LEC information on which these costs purportedly are based.

Part III addresses input values for switching and interoffice facilities:

Switch costs. Contrary to the suggestion in the *Further Notice*, the proposed HAI switch input values are supported by a variety of sources, and the Commission is fully justified in relying on them as the most accurate estimates of forward-looking switch costs. If the Commission nonetheless chooses to rely on the historical price information provided by Gabel/Kennedy, AT&T and MCI WorldCom agree that the Commission must also include its RUS data component. AT&T and MCI WorldCom further agree that $12 per line is a reasonable adjustment to the RUS data to account for MDF costs,

but oppose both the imposition of that charge on integrated DLC lines, and the Commission's decision to apply an engineering adjustment to power costs. Regardless of the data source used, however, it is critically important that the Commission restate older switch price data to reflect undisputed and significant decreases in switch prices over time. Finally, although AT&T and MCI WorldCom agree that it is appropriate to adopt the same per-line costs for all switch types, the proposed input values are significantly overstated, as confirmed by data submitted by both competing carriers and incumbents.

Other switching and interoffice transport. AT&T and MCI WorldCom agree that the depreciation data and the RUS data, appropriately adjusted as described above, include all relevant costs to make the switch functional, and that the MDF/Protector investment per line and power input values therefore should be set at zero (and the Switch Installation Multiplier at 1.0). The proposal to set the analog line circuit offset for digital lines to zero, and thereby to ignore the significant cost savings that result when switches serve lines provisioned on integrated DLC rather than an analog copper pair, however, is flatly inconsistent with forward-looking principles. AT&T and MCI WorldCom also disagree with the proposal to apply an administrative fill factor of 94 percent to the entire switch investment – any such fill factor should be applied only against the line card portion of the switch investment.

Use of LERG. AT&T and MCI WorldCom disagree with the proposal to look to the LERG database to determine whether a particular wire center should house a host/standalone or a remote switch. Use of this embedded data directly contradicts the Commission's stated goal to model costs using efficient, forward-looking principles, and also is inconsistent with other engineering principles followed by the synthesis model.

Part IV addresses expense input values. Because the goal in this proceeding is to derive input values that will calculate accurate universal service costs, it is far better to estimate one-time costs through the use of non-date-specific SEC reports – as proposed by AT&T and MCI WorldCom – than to fail to exclude any of these costs at all. In addition, the proposed 6 percent productivity factor is too low to reflect actual incumbent LEC productivity gains, as the Commission itself has recognized elsewhere.

Part V addresses capital costs. AT&T and MCI WorldCom support the tentative depreciation conclusions, but seek clarification that the Commission does not intend to preclude accounting for the impact of deferred taxes. AT&T and MCI WorldCom do not agree with the tentative conclusion that that the current federal cost of capital rate, established in 1990, should be used to calculate universal service costs. Finally, AT&T and MCI WorldCom support the tentative decision to use HAI's expense module to develop annual charge factors.

Part VI addresses the Commission's efforts to define the term "local exchange operating entity," as used in section 153(37) of the Communications Act, and shows that this term should apply on a statewide, holding company basis.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter 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

COMMENTS OF AT&T CORP. AND
MCI TELECOMMUNICATIONS CORPORATION

Pursuant to the Commission's *Further Notice*,[1] AT&T Corp. ("AT&T") and MCI WorldCom, Inc. ("MCI WorldCom") hereby submit their comments on the input values the Commission proposes to use in determining high cost support for non-rural carriers beginning January 1, 2000.

INTRODUCTORY STATEMENT

AT&T and MCI WorldCom agree with the vast majority of tentative conclusions reached in the Commission's *Further Notice*, and believe that those conclusions are fully supported by the record in this proceeding. Implementation of these proposals will significantly advance the process of estimating forward-looking costs beyond the

[1] Further Notice of Proposed Rulemaking, *Federal-State Joint Board on Universal Service, Forward-Looking Mechanism for High Cost Support for Non-Rural LECs*, CC Docket Nos. 96-45, 97-160, 1999 WL 343066 (rel. May 28, 1999) ("*Further Notice*").

Commission's pro-competitive determinations in the *Platform Order*.[2] Accordingly, these comments focus on the minority of the Commission's tentative conclusions that AT&T and MCI WorldCom believe are misguided in significant ways and, if adopted, would result in universal service cost estimates inconsistent with the Commission's own forward-looking principles.

I. DETERMINING CUSTOMER LOCATIONS

A. Geocode Data

AT&T and MCI WorldCom agree with the Commission's consistent position that "geocode data that identify the actual geographical locations of customers are preferable to algorithms intended to estimate customer locations based solely on such information as Census data."[3] In light of near unanimous agreement on the superiority of actual geocode data to surrogate methods, however, AT&T and MCI WorldCom strongly disagree with the Commission's subsequent conclusion that customers should be located exclusively by road surrogate algorithms until the Commission selects a particular source of geocode data. *Further Notice*, ¶ 25.[4] Rather, the more accurate PNR geocode data currently

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[2] Fifth Report and Order, Federal-State Joint Board on Universal Service, 13 FCC Rcd. 21323 (1998) ("*Platform Order*").

[3] "[A] model is most likely to select the least-cost, most-efficient outside plant design if it uses the most accurate data for locating customers within wire centers, and that the most accurate data for locating customers within wire centers are precise latitude and longitude coordinates for those customers' locations." *Further Notice*, ¶ 26 (*citing Platform Order*, ¶ 33).

[4] Neither the Commission nor any commenter has identified any systematic deficiencies in the accuracy of currently available geocode data. The sole complaint appears to be that "interested parties have not had adequate access or time to review such data." *Further Notice*, ¶ 25. As discussed below, such contentions are baseless.

available should be used in the federal universal service mechanism instead of displacing it with customer location estimations from inferior surrogate algorithms.

The exclusive use of road surrogate data has been proven to introduce upward bias in cost when measuring on a study area basis.[5] Road surrogate information produces overestimation of plant because road surrogate models, which uniformly disperse customers along roads, fail to take into consideration actual uneven customer distribution.[6] In reality, and as common experience confirms, customers tend to cluster unevenly along roads and even leave stretches unpopulated.[7] Thus, ignoring geocode data that reveal actual customer densities along roads in favor of exclusive road surrogate use will unevenly, and unnecessarily, overestimate the amount of plant required. For example, while road surrogate use in non-rural study areas increases estimated loop costs by 2.7 percent, on average, it can produce cost inflation of over ten percent in some study areas.[8] Not surprisingly, these inconsistencies are even greater when costs are measured at the wire center level.[9] In short, any alleged difficulties with the openness of the PNR

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[5] *See* AT&T Aug. 28, 1998 Comments at 3-4; AT&T May 20, 1999 *ex parte*.

[6] *Id.* This point is further illustrated in an *ex parte* submission to this docket filed by Ameritech on July 14, 1999, which contains satellite photos of portions of Ameritech's territory. These satellite photos show more clustering of customer locations than is implied by the Commission's surrogate road locations. *See* Letter from Celia Nogales, Ameritech, to Secretary, FCC, July 14, 1999, CC Docket No. 96-45, 97-160.

[7] *Id.* Even though PNR's surrogating methodology has increased its accuracy by excluding road segments unlikely to have customers, it still provides an estimation which is inferior to actual geocode points.

[8] For example, the U S West Oregon study area monthly loop costs increased 13 percent by substituting road surrogate data. AT&T May 20, 1999 *ex parte* letter to Secretary, FCC.

[9] The GTE Oregon WC VRNNORXX wire center, for example, experienced an increase

(continued . . .)

data are, in aggregate, more than offset by the fundamental guesswork nature and established cost inflation of the road surrogate data approach. Thus, while the Commission may continue to search for even better geocode data, it should not rely upon inferior road surrogate models in the interim when more accurate geocode data currently is available.[10]

The Commission seeks comment on additional sources of geocode data as well as on the availability of PNR processes and data for public review. *Further Notice,* ¶ 28. At this time, no viable alternatives to the PNR geocode data exist or are expected to exist in the near future. Geocode data may well be improved over time, but the supplemental development process should not serve to delay the use of accurate, immediately available PNR data for the federal universal service mechanism.

Instead of seeking new third-party sources of geocode data, AT&T and MCI WorldCom strongly urge the Commission to take the more expedient step of requiring the incumbent LECs to provide accurate customer location or service address information that can be used to enhance the percent of locations successfully geocoded. The incumbent LECs are the logical source of the customer location information needed to ensure accurate geocoding. The Commission therefore should require incumbent LECs to provide this information. For example, the Commission could condition an incumbent

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of 47 percent. While the Commission proposes at present to use cost estimates only at the study area level, as competition develops the Commission may need to use costs at the wire center level. If that occurs, this differential effect by wire center will become extremely important.

[10] If the Commission does discard PNR's available actual geocode points in favor of road surrogate data, it should adjust downward all loop cost estimates by the percentages indicated in AT&T's May 20, 1999 *ex parte* submission.

LEC's privilege of drawing upon the universal service fund on its provision of comprehensive customer location information which would allow PNR to generate accurate geocode points for all customers within the incumbent LEC's service area, rather than allowing the incumbent LEC to draw on universal service funds for customer locations that it refuses to identify.

Finally, the Commission continues to question the availability of PNR data for review by the public despite every possible accommodation by PNR to allow for outside access. *Further Notice,* ¶ 28. These concerns are unfounded. Interested parties have received as much (or more) access to these data as to any other data submitted in this proceeding. Indeed, the Commission and PNR gave users of the model access to the clustering routines and the geocode point data for *all* of the road surrogate data, and thus full access to the underpinnings of the process. Interested parties also have had significant opportunities to review the PNR data in state proceedings.[11] In addition, PNR has repeatedly offered interested parties the opportunity to come to PNR's location to assess the accuracy of the real geocode data in question. This access is even more extensive than that provided for Census Bureau data.

Further, the accuracy of PNR geocode data generally is *easier* to verify than the accuracy of other data submitted in this proceeding. Unlike much of the incumbent LECs' cost data, which often is unsupported by primary sources and virtually impossible to verify, PNR's geocode data can be verified merely by determining whether a customer

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[11] Other parties, including GTE, U S West, and Sprint, have already had repeated access to the PNR data in the context of state proceedings. In fact, some have even been sufficiently impressed by the probative value of PNR geocode information that they have (continued . . .)

resides at the location indicated by the data. Even more importantly, PNR personnel have always made themselves available to answer questions and explain, on a firsthand basis, the direct linkage between input data and modeled customer location outputs.

To the extent that parties still allege concerns over access to, and accuracy of, PNR geocode data, the Commission could address these allegations by formally sponsoring additional PNR open house workshops. These workshops would allow interested parties to have additional access to the underlying PNR data (and continued direct access to the PNR staff) similar to that offered in state proceedings.[12] This approach also could be employed on a larger scale to ensure full public access to PNR geocode data.[13] In sum, although AT&T and MCI WorldCom support the development of additional sources that can provide accurate geocode data, the best option at this time is to use the most accurate customer location data available today – PNR geocode data.

B. Road Surrogate Customer Locations

As discussed above, AT&T and MCI WorldCom support the use of geocoded data points to identify the geographical locations of customers. If the Commission nonetheless elects to use 100 percent road surrogate data pending the adoption of geocode data, AT&T and MCI WorldCom endorse the use of the PNR road surrogating

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employed PNR and its geocoding in a recent federal proceeding. *See* GTE May 26, 1999 Comments, CC Docket No. 96-98, at Appendix D.

[12] During the Minnesota and Nevada state proceedings, open house sessions provided an opportunity for close scrutiny of the PNR methodologies.

[13] Indeed, the Commission should require that incumbent LECs' data be subject to these same standards of verification, and that incumbent LECs provide direct public access to their personnel responsible for the development of these data.

algorithm. The Commission correctly concludes that the PNR road surrogate algorithm is the most reasonable method for locating customers in the absence of actual geocode data.[14] In fact, no nationwide alternative to the PNR road surrogate data has been proposed, and, as a practical matter, it is doubtful whether the Commission could make major changes to PNR's established data process at this late date and still meet the Commission's established timeframes.

AT&T and MCI WorldCom also agree that the Stopwatch data set will not comply with the *Universal Service Order*'s[15] criterion that the underlying data be available for review by the public. *Further Notice,* ¶ 33. In particular, Stopwatch's six-state availability nullifies its utility as a data source to a national cost model (particularly as compared to PNR, which already has made its road surrogate data points available for review for virtually all states).

C. Methodology For Estimating The Number Of Customer Locations

AT&T and MCI WorldCom agree that PNR's methodology for estimating the number of customer locations should be used for developing customer location data. *Further Notice,* ¶ 43. AT&T and MCI WorldCom also agree that PNR's process for estimating the demand for service at each location, and for allocating customer locations to wire centers, is consistent with the synthesis model's design. *Id.* The PNR methodology includes the cost of providing service to all currently served households,

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[14] *Further Notice,* ¶¶ 31-34.

[15] Report and Order, *Federal-State Joint Board on Universal Service*, 12 FCC Rcd. 8776 (1997) ("*Universal Service Order*").

and therefore is consistent with a forward-looking cost model, which is designed to estimate the cost of serving current demand. *Id.*

The Commission questions whether PNR's residential location estimates may exclude temporarily vacant households or overestimate the number of unoccupied units due to churn in the housing market. *Further Notice,* ¶ 46. However, the Commission also recognizes that the "PNR methodology may [already] provide an estimate of the number of residential locations that is greater than the number that currently receive telephone service." *Id.* In fact, PNR uses Metromail as the main source for its geocode points, and the number of U.S. locations receiving mail generally exceeds the number of locations receiving telephone service. As a result, PNR's data already include many locations that do not currently have telephone service.[16] Additionally, the Commission's proposed conservative fill factors in the synthesis model will ensure sufficient plant capacity to accommodate potentially uncounted service needs without requiring an alteration of PNR's methodology.[17]

Finally, the Commission requests comments regarding the use of BLR wire center information to estimate wire center boundaries. *See Further Notice,* ¶ 47. The widespread reliance of cost models including BCPM, HAI, and HCPM on BLR data is a strong indicator of the accuracy and reliability of these data. However, as with customer location information, incumbent LECs who maintain the only current alternative source

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[16] In addition, because many locations not receiving telephone service are interspersed between locations that do receive service, there are only minimal extra costs in extending the loop distribution network to serve these locations.

[17] *See Further Notice,* ¶¶ 96-102 (proposing the appropriate balance of "fill factors" or spare capacity to accommodate expected growth or other additional capacity needs).

of accurate wire center information could significantly supplement BLR data. AT&T and MCI WorldCom recommend that the Commission require the incumbent LECs to provide such information to enable a meaningful assessment of the accuracy of the BLR data.

II. OUTSIDE PLANT INPUT VALUES

A. Copper And Fiber Cable Engineering Assumptions And Optimizing Routines

1. Optimization

AT&T and MCI WorldCom fully support the Commission's tentative conclusion that "the synthesis model should be run with the optimization *turned on* when the model is used to calculate the forward looking cost of providing the services supported by the federal mechanism." *Further Notice*, ¶ 58 (emphasis added). Indeed, the Commission's *Universal Service Order* criteria mandate the use of full optimization because "the optimization approach represents what a network planning engineer would attempt to accomplish in developing a forward-looking network." *Id.; see also Universal Service Order*, ¶ 250. In other words, full optimization is the only approach that reflects the use of "the least-cost, most efficient, and reasonable technology for providing the supported service that is currently being deployed." *Further Notice*, ¶ 58.[18]

The Commission nonetheless seeks comment on "whether an acceptable compromise to full optimization would be to set the optimization factor at '-p500,' as described in the model documentation." *Id.* The Commission suggests that using this intermediate value may be desirable because full use of the optimization algorithm "can

[18] The failure to use the optimization algorithm impermissibly results in inflated network costs "that may be significantly higher than with the optimization." *Further Notice*, ¶ 57.

substantially increase the model's run time," and because preliminary Staff analysis has indicated that "for clusters with line density greater than 500, the rule of thumb algorithm results in the same or lower cost for nearly all clusters." *Id.*

AT&T and MCI WorldCom believe that it is inappropriate to deviate from full optimization merely to reduce the run time of the *final* run used to determine the forward looking cost of providing universal service. The development of local competition and the rationalization of universal service support will best be served by ensuring that the cost model produces its most *accurate* results, not just quick ones.

In addition, if an intermediate value is to be chosen, it should be set at least as high as –p850 to ensure sufficiently accurate results. The Staff's analysis indicating the possible sufficiency of the -p500 value is preliminary,[19] and AT&T's and MCI WorldCom's testing indicates that greater accuracy can be obtained for some areas by setting the optimization factor at –p850 rather than –p500.[20] The Commission should not be willing to tolerate these inaccuracies, which distort the model's results, merely to shorten run times.[21]

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[19] The Commission has indicated that "[a]fter staff has completed its analysis of comparison runs, [the Commission] intend[s] to make available a spreadsheet showing the estimated percentage change, for each non-rural study area, between running the model with the distribution optimization disabled and running the model with the distribution optimization enabled." *Further Notice*, ¶ 58.

[20] For example, setting the optimization factor at –p850 rather than –p500 produces a deviation as high as 10 percent in some wire centers. Specifically, setting the factor at –p850 rather than –p500 produced a 10 percent decline for GTE Idaho for WC HRSNIDXA and PTLTIDXX, and a 7 percent decline for NWB Nebraska for WC HOMRNENW.

[21] Setting the optimization factor at –p500 also is undesirable because 500 falls in the middle, rather than at the boundary, of a density zone.

2. T-1 Technology

AT&T and MCI WorldCom support the Commission's tentative conclusion that it should not use the T-1 option in the current version of the synthesis model. *Further Notice*, ¶ 61. The synthesis model uses digital copper T-1 technology as an alternative to analog copper or digital fiber *feeder* for certain loop lengths under 24,000 feet, and AT&T and MCI WorldCom believe that using T-1 technology in that manner is not forward-looking. However, AT&T and MCI WorldCom strongly encourage the Commission to modify the synthesis model to use T-1 technology in the same manner as does the HAI model – *i.e.*, as a *distribution* alternative in those rare cases (much less than 1 percent of total loops) where, after using fiber fed integrated digital loop carrier ("IDLC") to link a main cluster of customer locations with a serving wire center, outlying customer locations beyond 18,000 feet from the main cluster's center are served by copper T-1 distribution loops.[22] As AT&T and MCI WorldCom have previously explained, the HAI sponsors examined various alternatives to serve these long loops, including use of fiber-fed digital loop carriers ("DLCs") and high bit-rate digital subscriber lines ("HDSL"), and concluded that, in these special circumstances, T-1 technology represents the most economically efficient option for provisioning the services that will receive universal service support.[23]

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[22] *See, e.g.*, HAI Inputs Portfolio (Jan. 27, 1998) at 39.

[23] *See, e.g.*, AT&T/MCI WorldCom Sept. 24, 1997 Comments at 17-18; AT&T/MCI WorldCom Oct. 3, 1997 Reply Comments at 11-15. The use of HDSL over copper is not a cost effective solution at distances greater than 18,000 feet because HDSL requires costly repeaters every 12,000 feet, and dual HDSL terminals for loops which extend more than 36,000 feet. AT&T/MCI WorldCom Sept. 24, 1997 Comments at 17-18.

3. Distance Calculations And Road Factor

AT&T and MCI WorldCom support the Commission's tentative conclusion that "the synthesis model should use rectilinear distance, rather than airline distance, in calculating outside plant distances." *Further Notice*, ¶ 62. As the Commission found, the use of rectilinear distance "more accurately reflects the routing of telephone plant along roads and other rights of way." *Id.* AT&T and MCI WorldCom also agree with the Commission that the road factor should be set equal to 1.0. *Id.* To the extent that road surrogates are used in place of real geocode points, the use of surrogate customer locations already *overstates* the amount of outside plant necessary to provide universal service,[24] and a road factor greater than 1.0 thus would only further inflate the model's results.

The Commission also "note[s] that airline distance could be used in the model, if [the Commission] were to derive accurate road factors," and seeks comment on this issue. *Further Notice*, ¶ 63 (citing Robert F. Love, et al., *Facilities Location: Models and Methods*, Chpt. 10 (1998)). As AT&T and MCI WorldCom previously have described in the context of determining customer locations, the use of "road factors" is undesirable because this approach does not account for variations in population distribution that often arise along different roads in very small geographic areas.[25] Some roads will attend industrial zones, others residential areas, and still others primarily retail or service oriented activities. And, of course, some roads will have a mix of one or more types, or

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[24] *See, e.g.*, AT&T/MCI WorldCom Oct. 3 1997 Reply Comments at 4; AT&T/MCI WorldCom Sept. 10, 1998 Reply Comments at 4-5.

[25] *See, e.g.*, AT&T/MCI WorldCom Sept. 10, 1997 Reply Comments at 4-8; AT&T Aug. 28 Comments at 3-4; *see also* Ameritech July 14, 1999 *ex parte*.

no telephone customers at all. The road factor approach also fails to account for the presence of backlot feeds – *i.e.*, feeds that do not use road rights-of-way. Thus, it is highly unlikely that multiplying airline distance by a "road factor" will produce results that are more accurate than the results produced by using rectilinear distance. There certainly has been no such demonstration on the record in this proceeding.

B. Cost Of Copper Cable

1. Underground, Buried, And Aerial Copper Cable Costs.

AT&T and MCI WorldCom agree with the Commission's tentative conclusion that it "should adopt separate input values for the cost of aerial, underground, and buried cable." *Further Notice*, ¶ 68. Both BCPM and HAI provide cable cost estimates that vary by type of plant (once installation costs are included), and the Commission's own analysis of cable cost data has revealed "considerable differences in the per foot cost of cable, depending upon whether the cable was strung on poles, pulled through conduit, or buried." *Id.*, ¶¶ 67-68. Accordingly, there is widespread agreement that the Commission should adopt separate input values for the cost of aerial, underground, and buried cable.

AT&T and MCI WorldCom do not agree, however, with the specific input values that the Commission has proposed for the cost of aerial, underground, and buried cable. These values are based on the Commission's tentative conclusion that it should use the estimates in the NRRI study as modified by the Huber "robust regression" methodology. *Further Notice*, ¶¶ 72-77, 82, 83. As applied to the NRRI data, however, the Commission's Staff's methodology (as described in Appendix D to the *Further Notice*) produces inconsistent and arbitrary results.

For example, although the Staff's methodology properly assumes that per-pair cable costs should taper off as cable pair size increases, its tapering component has far

too great an effect on the model's results. Indeed, if left unadjusted, the component can produce a *negative* cost per foot for underground cable. *See* Exhibit A. In an attempt to remedy this defect, the Staff apparently altered the underground cable equation. This alteration caused a $0.01 per foot cost increase at 50 pairs, rising to an increase of $5.20 per foot above the Staff's calculated result at 2100 pairs. At that point, the tapering equation was stopped altogether, and a straight line method was used to reflect costs for pair sizes ranging from 2400 to 4200 pairs. Although this "fix" prevents the tapering component from producing a negative cost per foot for underground cable, it reveals that the coefficients of the tapering component are inherently defective as an initial matter, and that the straight line "fix" is essentially unsupported.[26]

This arbitrary fix also is made necessary, in part, by defects in the NRRI data. For example, the RUS data consists primarily of small (6, 12, 25, and 50 pairs) 24-gauge cable. Indeed, 74 percent of the data relates to small cables of 50 pairs or less, and 95 percent of the data relates to cable sizes of 200 pairs or less. In addition, outliers in the RUS data are numerous,[27] and few data are available for underground cable (only 80 observations are reported in Appendix D of the *Further Notice*). As a result, the RUS data often are inaccurate (especially for underground cable and cable sizes above 200 pairs) and produce systematically anomalous results when used in the synthesis model.

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[26] Exhibit A shows a tapering equation that emulates the HAI recommended copper cable costs without producing a negative value within the range of appropriate pair sizes.

[27] For example, the Huber methodology attempts to mitigate the effects of data that show the cost of a 6-pair cable ranging from $0.39 per foot to $6.66 per foot, the cost of a 12-pair cable ranging from $0.43 per foot to $6.73 per foot, and the cost of a 100-pair cable ranging from $0.89 per foot to $10.93 per foot.

The copper cable cost data submitted by the incumbent LECs are even worse. In the last several weeks, AT&T and MCI WorldCom have conducted an extensive examination of the documentation that has been proffered to support the incumbent LECs' cost figures, and have asked the incumbent LECs to provide a logic-trail showing the link between their actual contract costs and the spreadsheet entries they submitted to the Commission. Unfortunately, in no case was it possible for AT&T and MCI WorldCom to find the claimed link between the incumbent LECs' contract data and their proposed costs.[28]

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In light of the foregoing, AT&T and MCI WorldCom believe that the Commission should determine copper cable *material* costs using RUS data modified, as

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[28] Data was reviewed from Aliant, Ameritech, Bell Atlantic, BellSouth, SBC, Sprint, and GTE.

[29] *See, e.g.*, BellSouth Excel Workbook: "*bsload.xls*," Spreadsheet: "*INPLT-OSP*," titled "*1996 In-Plant Factors (OSP FRCs)*" (July 28, 1997); *Ameritech Facility Analysis Model ("AFAM") Overview*, Tab 5.

necessary, according to the logical analysis submitted in this proceeding. **[***BEGIN PROPRIETARY***]**

[*END PROPRIETARY***]** Second, the costs for cable placing, splicing, and engineering should be added to material costs using a methodology similar to that used by the Commission's Staff in determining appropriate indoor feeder distribution interface ("FDI") costs. *See Further Notice*, ¶¶ 133-141. Specifically, the Commission should adopt reasonable values for the costs of cable placing, splicing, and engineering based on the expert opinions submitted in this proceeding. *See, e.g.,* Exhibit A (showing the Commission's proposed splicing rates, labor rates, and the HAI sponsors' best estimates for other appropriate values). By adopting AT&T's and MCI WorldCom's proposed methodology, the Commission will be able to avoid the defects caused by the RUS data and the incumbent LECs' loading factors, and will be better able to determine a logical set of forward-looking copper cable costs. *See* Exhibit A (showing the copper cable costs that would result from the application of this straightforward approach).

2. Splicing Costs

Even if the Commission does not adopt the copper cable cost methodology proposed by AT&T and MCI WorldCom in the previous section, AT&T and MCI WorldCom strongly disagree with the Commission's tentative conclusion to "adopt a loading of 9.4 percent [of copper cable investment] for splicing costs." *Further Notice*, ¶ 81. This 9.4 percent figure – derived from a study of 24-gauge cable conducted by NRRI – greatly exceeds the HAI sponsors' recommended figure of 4.4 percent, exceeds the BCPM sponsors' recommended figure of 7 percent, and is almost double the 4.7 percent loading factor the Commission tentatively concluded is appropriate for fiber

cable.[30] As explained in AT&T's and MCI WorldCom's February 9, 1999 *ex parte* submission, the maximum forward-looking cost of splicing varies between 3.4 and 6.9 percent of cable investment, depending on the number of pairs in the cable, and the Commission therefore should not adopt a loading factor for splicing that exceeds the average value of 4.4 percent.[31]

The 9.4 percent figure is excessive because it is based on an NRRI study – which in turn is based on RUS data – that fails to appropriately account for the use of forward-looking splicing methods and reflects the small scale of RUS companies (*e.g.*, by focusing on small cables).[32] First, in their January 29, 1999 *ex parte* meeting with the Commission, AT&T and MCI WorldCom demonstrated and produced documentation showing that modular splicing is the most forward-looking splicing method, with typical speeds of 300 pairs or more per hour.[33] By contrast, the use of individual mechanical splicing connectors represents an inferior splicing method, with typical speeds of only 75 to 100 pairs per hour. Rather than basing its splicing study on the forward-looking methodology of modular splicing, NRRI based its study on RUS data which contained 160 observations of individual mechanical splicing and only 30 observations of modular

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[30] *See, e.g.*, AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 10 n.23 (citing BCPM2 folder, "table inputs," cell B44); *Further Notice*, ¶ 91.

[31] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 9-10.

[32] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 7. The Commission has recognized the need to adjust cable costs downward to reflect the buying power advantages that large Tier 1 companies enjoy. The Commission also should recognize the need to adjust cost factors downward to reflect the technological advantages that large Tier 1 companies may enjoy.

[33] The Commission has tentatively proposed a rate of 250 per hour for modular splicing. *Further Notice*, ¶ 138.

splicing, and thus was heavily weighted toward the use of an outdated and inefficient technology.[34] Second, the RUS data included few instances of cable observations in excess of 400 pairs. Indeed, 98 percent of the RUS data is for cables that are 400 pairs or less (based on sheath feet of cable). This limitation further skewed the NRRI study results because cables of 600 to 4200 pairs typically have lower ratios of splicing costs to cable materials investment than do cable observations of 6 to 400 pairs.[35] Third, the NRRI data include frequent splices that have no other purpose than to splice drop terminals into small distribution cables. In the synthesis model, these splices are already part of the installed cost of drop terminals, and thus would be double counted if included in copper cable costs.[36]

To remedy these defects and derive a splicing cost loading factor that reflects the use of forward-looking technology – as required by the Commission's *Universal Service*

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[34] The RUS data most likely show a high incidence of individual mechanical splicing because the data are somewhat dated, and because the small carriers surveyed in this study typically splice together very small cables (usually with 25 pairs). As a result, these carriers may not have set up a splicing machine to splice the small number of pairs that these cables require. Even for these small cables, however, an efficient, forward-looking carrier should use a splicing module to ensure high quality splices.

The NRRI study also makes improper use of RUS data that reflect the use of block terminal splices. For smaller distribution cables, block terminals are spliced into the cable. In the synthesis model, the cost of such splicing is included in the cost of the block terminal, and thus should not be added to the cost of the distribution cable.

[35] This lower ratio for larger pair sizes results from the fact that the fixed costs of preparing a cable for splicing can be spread more efficiently as the number of pairs increases.

[36] In addition, since the RUS data are based on more costly 24-gauge material, rather than 26-gauge material, utilizing a splicing cost as a percent of material investment improperly represents the cost of splicing 26-gauge cable, because splicing productivity is not affected by wire gauge.

Order criteria – the Commission should adopt the splicing component method advocated by AT&T and MCI WorldCom based on 250 pairs per hour. At the very least, the Commission should adopt a loading factor that is based on the use of modular splicing and that reflects an average value across all cable sizes, not just cable sizes of 400 pairs or less. As shown in AT&T's and MCI WorldCom's February 9, 1999 *ex parte* submission, such a figure should not exceed 4.4 percent.[37]

3. Estimating The Cost Of 26-Gauge Copper Cable

Although AT&T and MCI WorldCom agree with the Commission's tentative conclusion that it "should derive cost estimates for 26-gauge cable by adjusting . . . estimates for 24-gauge cable," they do not agree with the Commission's tentative decision to "estimate the ratio of the cost of 26-gauge cable to 24-gauge cable . . . using data . . . submitted by Aliant and Sprint and the BCPM default values for these costs." *Further Notice*, ¶ 86.

As explained in AT&T's and MCI WorldCom's February 9, 1999 *ex parte* submission, Dr. Gabel and the HAI sponsors agreed that the cost of 26-gauge copper should be derived by using the relative weight of copper to adjust the cost of 24-gauge copper.[38] This relative weight methodology not only has widespread support, it is the logical approach to estimating 26-gauge copper costs because such costs are directly proportional to the weight of metallic copper in the cable.[39]

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[37] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 7-10.

[38] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 5-6.

[39] *Id.* The reduced costs of the polyethylene cable jacket and plastic wire insulation for 26-gauge cable relative to 24-gauge cable are negligible contributors.

The BCPM sponsors' attempt to refute this showing is unavailing. Their sole claim is that the logic behind the relative weight methodology is "faulty" because, if it were true, "a 2400 pair cable [would] cost 200 X the cost of a 12 pair cable."[40] But for the cable pair sizes for which the relative weight methodology would be used, the BCPM sponsors' own data show that a 2400 pair cable costs approximately 4 times as much as a 600 pair cable, and thus fully confirm the logic of the relative weighting approach.[41] The "faulty" information before the Commission is the "actual" cost figures provided by the BCPM sponsors, which are unsubstantiated by any contract data and indicate that the cost of 26-gauge copper cable is approximately 80 percent of the cost of 24-gauge copper cable. By contrast, the relative weighting methodology shows that the cost of 26-gauge copper cable is only 65 percent of the cost of 24-gauge copper cable.[42] The BCPM sponsors have offered no credible evidence to undermine the validity of this 65 percent figure, and, indeed, their own data confirm the legitimacy of the relative weighting methodology from which it is derived.

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[40] Sprint Feb. 26, 1999 *ex parte* at 3.

[41] *Id.* (Sprint does not provide data for a 12 pair cable). Sprint's data show that a 2400 pair 24-gauge cable costs $19.14, and a 600 pair 24-gauge cable costs $4.66. *Id.* Thus, increasing the number of cable pairs by fourfold increases cable costs by approximately fourfold ($19.14/4.66 = 4.1). Similarly, Sprint's data show that a 2400 pair 26-gauge cable costs $15.33, and a 600 pair 26-gauge cable costs $3.73. *Id.* Thus, increasing the number of cable pairs by fourfold once again increases cable costs by approximately fourfold ($15.33/$3.73 = 4.1).

[42] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 6 (citing the AT&T Outside Plant Handbook on cable weights).

C. Buying Power Adjustments For Buried Copper And Fiber Cable

In order to reflect the superior buying power of non-rural LECs, the Commission proposed that the regression coefficient for the number of copper pairs be reduced by 15.2 percent when estimating the costs of 24-gauge aerial copper cable, and by 16.3 percent when estimating the costs of 24-gauge underground copper cable. *Further Notice*, ¶¶ 79, 82. The NRRI study did not include a recommendation for such an adjustment for buried copper cable, and the Commission tentatively concluded that, for buried copper cable, it "should use 15.2 percent, which is the lower of the reductions used for aerial and underground [copper] cable." *Id.*, ¶ 84. Similarly, the Commission proposed that the regression coefficient for the number of fiber strands be reduced by 33.8 percent when estimating the cost of aerial fiber cable, and by 27.8 percent when estimating the cost of underground fiber cable. *Id.*, ¶¶ 91, 93. The NRRI study did not make a recommendation for a buying power adjustment for buried fiber cable, and the Commission tentatively concluded that it should again use the lower of these two numbers – *i.e.*, 27.8 percent – when estimating the cost of buried fiber cable. *Id.*, ¶ 95 n.182.

AT&T and MCI WorldCom support the Commission's buying power adjustments for aerial and underground copper and fiber cable materials, but oppose the arbitrary use of the lower of the two figures for buried cable. The buying power adjustments should be set at the higher figures of 16.3 percent for buried copper cable and 33.8 percent for buried fiber cable, especially since buried cable is the predominant type of cable placed in a forward-looking construct, or, at the very least, at the average of the higher and lower values for aerial and underground cable.

D. Cable Fill Factors

AT&T and MCI WorldCom believe that the Commission's tentative fill factor determinations are too low. *See Further Notice,* ¶¶ 98-102. Distribution fill factors sufficient to provide 1.2 lines per household are more than adequate in a forward-looking cost study. As AT&T and MCI WorldCom explained in their prior comments, the cable sizing algorithm used by the Commission to determine universal service costs produces effective fill factors that are lower than the optimal values. AT&T/MCI WorldCom Dec. 17, 1997 Comments at 13. Moreover, universal service support does not include residential second lines or multiple business lines. *Id.* at 13-14. Thus, while the Commission has selected HAI fill factors for its defaults, these factors are too low for use in a model intended solely for universal service.[43] Finally, the Commission properly rejected Ameritech's argument that fill factors should be set on the basis of existing fill levels – which reflect sufficient extra capacity to permit 10 to 20 years of growth – because today's ratepayers should not have to bear the additional costs of serving tomorrow's customers. *Further Notice,* ¶ 100. *See also Platform Order,* ¶ 66 (holding that an incumbent's existing design or assets may not legitimately serve as the starting point for estimating forward-looking costs).

The feeder fill factors input values tentatively chosen by the Commission which average HAI and BCPM fills are likewise too low. Default input values for copper feeder fill are properly sized to efficiently meet current demand plus more than sufficient administrative spares. *Further Notice,* ¶ 101. Further, fiber feeder fill factors of 100 percent are appropriate because the allocation of 4 fibers per IDLC site equates to an

[43] The HAI models *both* universal service and unbundled network element demand.

actual fill factor of 50 percent, since a redundant transmit and a redundant receive fiber are included in the 4 fibers per site. In addition, fiber capacity is highly scalable by the addition of easily installed electronic equipment using the roll-over capability provided by the two redundant fibers at every site. Thus, because fiber capacity can easily be upgraded, 100 percent fill factors applied to 4 fibers per site are sufficient to meet even unexpected increases in demand and to accommodate customer churn.[44]

E. Structure Costs

1. The Failure To Include An Adjustment For Non-Rural LEC Buying Power

The Commission's proposed values for structure costs are excessive because they fail to reflect an adjustment for non-rural LEC buying power. When the Commission determined the cost of copper and fiber cable, it repeatedly recognized that the estimates in the NRRI study should be adjusted to account for the fact that non-rural LECs have greater buying power, and thus lower input costs, than the RUS companies on which the NRRI study is based. *See, e.g., Further Notice,* ¶¶ 79, 82, 84, 91, 93, 95. Despite the fact that the structure cost estimates in the NRRI study are based on the same data source as the copper and fiber cable costs, the Commission failed to propose an analogous buying power adjustment for structure costs. This oversight should be corrected, and all structure costs should be reduced by at least 16.3 percent to reflect non-rural LEC buying power.

[44] In addition, HAI provides 100 percent redundancy of fiber to handle maintenance issues. *Further Notice,* ¶ 102.