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

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OFFICE OF THE SECRETARY

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

REPLY OF GTE IN SUPPORT OF ITS PETITION FOR RECONSIDERATION OF THE COMMISSION'S FIFTH REPORT AND ORDER

GTE Service Corporation and its affiliated domestic telephone operating companies ("GTE"), pursuant to 47 U.S.C. § 405 and 47 C.F.R. § 1.429, submit this reply in support of its Petition for Reconsideration of the Commission's Fifth Report and Order ("Petition").[1/] This Reply primarily addresses AT&T Corp.'s opposition comments ("AT&T Opposition"), but includes analysis of Model versions released shortly before and after GTE filed its Petition.[2/]

1/ In the Matter of Federal-State Joint Board on Universal Service, In the Matter of Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket No. 96-45, 97-160, *Fifth Report and Order*, FCC 98-279 (rel. Oct. 28, 1998) (the "Order").

2/ GTE was not able to fully review the December 7 and 17, 1998, and January 5, 1999, versions of the Model prior to filing the Petition, and was invited to supplement its Petition. *See* In the Matter of Federal-State Joint Board on Universal Service, In the Matter of Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket No. 96-45, 97-160, *Order*, DA 98-2567 (rel. Dec. 17, 1998) at ¶ 28.

I. AT&T HAS NOT SHOWN THAT THE MODEL WAS COMPLETE AND AVAILABLE FOR REVIEW AND COMMENT.

There is a simple premise underlying GTE's claim that the Order is procedurally defective: the Model, as adopted in the Order (the "Model"), is a new model that cannot be meaningfully evaluated and was never available to GTE (or any other party) for review and comment. A careful reading of AT&T's Opposition reveals that it does not (and cannot) take issue with this premise.

Specifically, AT&T does not assert that the Model is fully operational, that GTE is able to evaluate it completely, or that the Model should not have been thoroughly tested and analyzed *before* being adopted. AT&T does not say that it has been able to evaluate the Model and test its results.

AT&T offers no factual evidence that GTE's cost model experts are wrong when they say that the Model is, from a modeling perspective, a new model. Nor does AT&T contest the experts' assertions that a reliable cost model cannot be evaluated by studying piece parts from different cost models that were not designed to work together. GTE's claim that a cost model cannot be justified in the abstract, without rigorous testing and empirical support for the Model itself, is also unrebutted. Finally, nowhere in AT&T's Opposition does it claim that GTE was given the opportunity to meaningfully evaluate and submit evidence on the Model as adopted.

Instead of addressing these issues -- which are the basis for the instant Petition -- AT&T belabors an obvious point: that the Commission allowed several months to review and comment on "the principal components" from the BCPM, HAI and HCPM models, and

that GTE did, in fact, comment upon them.[3/] But, the review and comment period that followed the submission of those complete and operational models only further confirms the error of not affording GTE an opportunity to fully evaluate the new Model *before* it was adopted.

Looking past AT&T's usual rhetoric about the "absurdity" of GTE's "shrieks," AT&T is reduced to pleading that the Model is merely a "logical outgrowth" of public notices that somehow hinted at what the Commission might do with respect to a synthesis model.[4/] As GTE set forth fully in its Petition, an agency rule based on such a procedure is not legally sufficient.[5/]

In this case, the Administrative Procedure Act and Commission's own rules required the agency to publish a copy of the Model that could be meaningfully evaluated, and then allow the parties to evaluate and comment upon it.[6/] As the Commission itself made clear, application of this rule applies to a complex computer program that produces discrete results. Without the ability to reproduce those results, it is impossible to evaluate whether they are reasonable and reliable. Thus, the Commission properly insisted that the BCPM and HAI models be produced in operational form during the notice and comment period for inspection by all interested parties, to ensure that they functioned properly. Yet, the

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3/ AT&T Opposition at 6.

4/ *See* AT&T Opposition at 2 (because the Commission gave notice that "it *might* create a synthesized model," GTE had "the opportunity to comment upon the synthesizing *process*") (emphasis added).

5/ *Kooritzky v. Reich*, 17 F.3d 1509, 1513 (D.C. Cir. 1994); Petition at 9.

6/ Petition at 7-9.

undisputed fact is that no one (not even AT&T) submitted any specific comments on the Model, nor could they. Three months after its adoption, the Model still cannot be evaluated, and the absence of any opportunity to comment on it undermines AT&T's effort to justify the legality of the process that led to its adoption. If the Model is new, incomplete, and not operational -- problems that Bell Atlantic, SBC Communications, Inc. and BellSouth Corporation confirm -- then GTE did not have a "fair opportunity to present [its] views on the contents of the [Commission's] final plan."[7/]

Finally, AT&T opposes GTE's claim that the administrative record does not support the Model, but AT&T fails to cite any comments or empirical data discussing either the Model, or, more importantly, the reliability of its results.[8/] The Commission established completeness, openness, operability, reasonableness and reliability as the standards for the adoption of any cost model.[9/] AT&T does not claim that this Model meets any of those standards, nor could it. The Model is missing key platform components, such as a customer location database and surrogate location algorithm. It cannot be run for all 50 states. It does not generate outputs that can be compared to reality. Thus, no one

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7/ *Chocolate Manufacturers Ass'n of United States v. Block*, 755 F.2d 1098, 1104 (4th Cir. 1985).

8/ Despite AT&T's claim that "GTE is unable to identify even one instance in which the Commission adopted a contested model component . . . based on 'inadequate data' or 'secret data,'" *see* AT&T Opposition at 8, the Model's new interface module is an example of such a component.

9/ *See* Petition at 4-7.

knows whether it generates reasonable, reliable or plausible costs. Without this kind of support in the record, the Model is arbitrary and capricious on its face.

II. AT&T FAILED TO DISPROVE THE MODEL'S SUBSTANTIVE PROBLEMS.

AT&T opened its defense against the substantive problems with the Model by erroneously claiming that GTE argued that it is entitled to recover its "embedded" costs.[10/] In fact, not one word of GTE's petition makes that claim, either explicitly or implicitly. GTE made a different argument: that a forward-looking cost model must, by law, lead to the recovery of GTE's "actual" economic costs. GTE's interpretation of the Act is supported by the Commission's First Report and Order in the Local Competition docket, where it defined forward-looking costs as "the cost of producing services using the least cost, most efficient, and reasonable technology *currently available for purchase*, with all inputs *valued at current prices*."[11/]

AT&T likewise misstates BellSouth's complaint about the Model's expense module. Regardless of what level of marketing expenses the Commission deems appropriate in the "input" phase of this proceeding, the Model will not allow that value to be incorporated because the Model does not have that input category.

AT&T does not rebut GTE's claims that the Model violates Criterion 1, which says that a cost model's loop design should not impede the provision of advanced services. GTE explained that the Model's 18,000 foot copper loops cannot support ADSL service at speeds

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10/ AT&T Opposition at 2, 9.

11/ In re Local Competition Provisions in the Telecommunications Act of 1996 and In re Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers, CC Docket No. 96-98, 97-185, *First Report and Order*, FCC 96-325 (rel. Aug. 8, 1996) at ¶ 224 n.573 ("Local Competition Order") (emphasis added).

faster that 1.5 Mbps. AT&T concedes this. Thus, even if ADSL is not included in universal service, the Model "impedes" ADSL and thereby violates Criterion 1.

This reveals yet another flaw in the Model -- it designs a network for universal service that is incapable of meeting the transmission requirements of a network providing unbundled network elements ("UNEs"). The local loop for UNE purposes must "provide services such as ISDN, ADSL, HDSL and DS-1 level signals."[12/] ADSL is defined "as a transmission path that facilitates 6 Mbps digital signal downstream, 640 kbps digital signal upstream, while simultaneously carrying an analog voice signal."[13/] The Model's 18,000 foot loops cannot do that.[14/] The Order says that the 18,000 foot loop standard is a platform item. Thus, it cannot be modified for UNE purposes. Similarly, the Model excludes SS7 signaling links, thereby making it unsuitable for access reform purposes.[15/]

Because of these conflicting requirements and the Model's exclusion of numerous UNE and access related costs, Bell Atlantic requested clarification on the Model's proper use. In response, AT&T claims disingenuously that the Commission need not expressly restrict the Model's use to universal service because of the Order's statements about its

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12/ Local Competition Order at ¶ 380.

13/ *Id.* at ¶ 380 n.823.

14/ Supplemental Affidavit of Francis J. Murphy in Support of GTE's Reply at ¶ 3 ("Murphy at ¶ __") (Attachment A hereto), *see* Attachment A to Petition at ¶¶ 43-50.

15/ Murphy at ¶ 10.

limitations.[16] Yet, AT&T simultaneously claims that the Model could be modified for UNE and access reform proceedings.[17] The Commission should put an end to such mischief.

AT&T essentially ignores another aspect in which the Order violates Criterion 1 -- it abandons the requirement that the Model produce wire center line counts that "equal" actual wire center line counts, and average loop lengths that "reflect" the incumbent carrier's average loop lengths. Instead of addressing whether the Commission may ignore these requirements, AT&T discussed whether the Model could produce the correct numbers. GTE's point, however, is that the Commission no longer requires the Model to do so.[18] The external validity checks set forth in Criterion 1, to which the Commission subjected BCPM and HAI, will be disregarded now that the Commission has chosen its own Model.

AT&T defends the Model against GTE's allegation that it violates Criteria 8 and 9 on two grounds: (1) that the PNR data is merely an input to the Model, and (2) it is available for GTE to review. AT&T is wrong on both counts. First, the Commission defined inputs as the values that a user of the Model can change before running it.[19] Customer locations cannot and should not be changed by the user. Customer locations are (or should be) fixed. Until now, AT&T has agreed that customer locations are not an input. For example, the HAI Model's Inputs Portfolio describes each input to that model, but says *nothing* about

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16/ For instance, the Commission stated in the Order that the Model uses a less accurate switching module because "switching costs are less significant than they would be in, for example, a cost model to determine unbundled network element switching and transport costs." Order at ¶ 75.

17/ AT&T Opposition at 17 n.19.

18/ *See* Order at ¶ 66.

19/ Order at ¶¶ 2, 11

PNR's customer location data being an input. Second, PNR's data is not available. GTE has been unable to obtain the PNR data referred to in the GTE Data Request Order cited by AT&T. Without the PNR data, GTE cannot evaluate the Model.

AT&T questioned the accuracy of several Model defects alleged by GTE but, as usual, did not rebut them.[20/] As explained briefly below and in Mr. Murphy's affidavit, GTE's criticisms are valid:[21/]

- The Model includes no investment for test systems, such as the SARTS or MLT systems. This substantiates GTE's claim that the Model excludes important network functions. These costs are not captured by the Model's use of ARMIS data because ARMIS data is used only to develop test related expenses, and do not account for test *investments*;

- The Model excludes capitalized installation labor costs associated with switched trunks, thereby significantly understating trunk-related investments;

- The HAI Model documentation states that "interLATA links are excluded from the model because such links are not a part of the local exchange network." The Model's use of the HAI module to determine SS7 costs proves GTE's claim that the Model fails to include the costs of SS7 signaling links; and

- Even with the corrected 11:1 line-to-trunk ratio suggested by AT&T, the Model includes only 54% of the necessary trunks.

By pointing out these flaws, GTE is not demanding, as AT&T suggests, that the Model be perfect. GTE is merely demonstrating that the Model in its current state is far

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20/ For example, AT&T apparently agrees with the basis for GTE's claim that the Model violates Criterion 10: its switch module cost calculations lead to the averaging of switch costs in wire centers. AT&T Opposition at 15 n.17. Contrary to AT&T's Opposition, forward-looking switching costs depend not only on the specific needs of each wire center, but also the cost structure of different available switches. For these reasons, many types of switches are deployed today in the real network.

21/ Murphy at ¶¶ 6-15. In addition to Mr. Murphy's testimony, Dr. Roy's affidavit (Attachment E to Petition) also impeaches AT&T's claim that expenses are properly reflected by the Model due to its use of ARMIS data. *See* Roy at ¶ 31 (improper general support allocators).

from complete, seriously flawed, and cannot be evaluated meaningfully. The Commission's efforts to correct the Model should continue, but corrections should occur in conjunction with public comment, as the Model is developed. The Model should not be adopted until it has been fully evaluated and commented upon by all interested parties, all reasonable criticisms have been addressed, and the Model can be run to produce "plausible outputs" for all companies and states.

III. RECENT VERSIONS OF THE MODEL STILL CONTAIN MANY PROBLEMS.

As explained in the affidavits of Messrs. Murphy and Dippon, the most recent version of the Model still cannot be evaluated because it lacks, among other things: actual customer location data and a surrogate location algorithm, which are needed to meaningfully evaluate the Model's customer location module, as compared to real world conditions; the modified switching and expense modules; full documentation; and digital line carrier data.[22/]

In addition, the parts of the Model that can be reviewed show that the Model is still not working properly, and is seriously flawed.[23/] Of particular concern is the support for the Commission's decision to allow 18,000 foot copper loops. The cited documentation from PairGain Technologies ("PairGain") demonstrates that the maximum length of distribution cable using PairGain's HDSL-based DSL product over 26-gauge wire is 6.3 kft, and is only 10.2 kft on 24-gauge wire.[24/] Thus, loops using 24- and 26-gauge distribution wires that are longer than these maximum lengths will provide degraded service and, in some cases, no

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22/ Murphy at ¶¶ 17-22; Supplemental Affidavit of Christian M. Dippon in Support of GTE's Reply at ¶¶ 3-8 ("Dippon at ¶ __") (Attachment B hereto).

23/ Murphy at ¶¶ 23-36; Dippon at ¶¶ 9-15.

24/ Murphy at ¶¶ 32-34.

service at all.[25] The formulae in the expense modules have the errors described in Dr. Roy's affidavit, and the modules still are not capable of using per line expense inputs.

IV. CONCLUSION.

For the foregoing reasons, the Commission should set aside the Order, complete the Model – platform and inputs -- and subject it to an appropriate notice and comment period.

Respectfully submitted,

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25/ Murphy at ¶ 34. The PairGain documentation also corroborates GTE's claims that the Model does not have the capability to capture the cost differences associated with different technology choices (such as T-1 repeaters vs. HDSL) or design constraints. Murphy at ¶¶ 35-36.

CERTIFICATE OF SERVICE

I, Thomas W. Mitchell, do hereby certify that on this 25th day of January, 1999, I have caused a copy of the foregoing Reply of GTE In Support of Its Petition for Reconsideration of the Commission's Fifth Report and Order to be served, via hand delivery, or as otherwise indicated, upon the persons listed on the attached service list.

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SUPPLEMENTAL AFFIDAVIT OF
FRANCIS J. MURPHY
IN SUPPORT OF GTE'S REPLY

Introduction and Summary

I, Francis J. Murphy, being duly sworn, depose and say as follows:

1. I am filing this affidavit for two purposes. The first purpose is to respond to the comments of AT&T Corp. ("AT&T") filed on January 15, 1999,[1] ("Opposition Comments") in opposition to GTE's Petition for Reconsideration filed December 18, 1998 ("GTE's Petition").[2] The second is to provide supplemental information regarding the analyses I have performed since the filing of my affidavit in support of GTE's Petition.[3]

[1] *See* Opposition of AT&T Corp. To Petitions for Reconsideration and Clarification, CC Docket Nos. 96-45 and 97-160, DA 98-1587, January 15, 1999.
[2] *See* GTE's Petition for Reconsideration of the Fifth Report and Order, CC Docket Nos. 96-45 and 97-160, December 18, 1998.
[3] *See* Affidavit of Francis J. Murphy in Support of GTE's Petition for Reconsideration of the Fifth Report and Order, CC Docket Nos. 96-45 and 97-160, December 18, 1998.

2. In my affidavit filed on December 18, 1998, I provided a detailed explanation of why I was unable to fully evaluate the FCC Model ("Model") adopted by the Commission in the Fifth Report and Order.[4] That affidavit was based on analysis of the Model released on the FCC web site on December 7, 1998. Since that time, the FCC released new versions of the Model on December 17, 1998, and January 5, 1999. My analysis of the latest releases of the Model[5] reveals that most of the issues that prevented me from fully evaluating and validating the December 7, 1998, version of the Model have still not been resolved. As a result, contrary to the arguments set forth in AT&T's Opposition Comments, I am still unable to fully evaluate and validate the Model.

Comments On The Opposition Of AT&T Corp

3. AT&T's Opposition Comments imply that the FCC Model does not impede the provision of advanced services because it is capable of supporting ISDN and some forms of ADSL.[6] AT&T also implies that the Model need only support some forms (not all forms) of ADSL because "the later generation ADSL services cited by the LECs are not even *available* today

[4] *See* Federal-State Joint Board on Universal Service and Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket Nos. 96-45 and 97-160, *Fifth Report and Order*, FCC 98-279, (rel. October 28, 1998).

[5] This affidavit is based on the January 5, 1999 version of the Model. For purposes of this affidavit, there was insufficient time to analyze the new version of the Model released on the FCC web site on January 19, 1999. Our attempts to begin an analysis of this latest version of the model have been hampered by excessive download times, corrupt files and prolonged run times that have only ended with error messages. Despite three days of extensive efforts by three seasoned professionals experienced in running this and other cost models, NECI has been

to most customers."[7] AT&T is incorrect. LECs are now offering later-generation ADSL services. For example, SBC declared in a recent press release that it intends to equip 526 central offices with ADSL technology.[8] This will enable SBC to offer 10.5 million customers downstream connections of up to 6 Mbps, and an upstream connection up to 384 Kbps.[9] For the reasons discussed in my December 18, 1998, affidavit, the FCC Model's 18,000 foot copper loops cannot support connections of these speeds, which are being offered by SBC today, not at some point in the future as asserted by AT&T.[10] In addition, the FCC's forward-looking cost study criteria mandate that the "model should not impede the provision of advanced services,"[11] but do not require advanced services to be available to "most customers."

4. AT&T's support of 18,000 foot loops is also in direct conflict with Chairman Kennard's 1999 agenda for the FCC. In a recent speech, Chairman Kennard stated that one of the FCC's challenges in 1999 is "to ensure that all Americans have access to the wonders of the communications revolution."[12] Mr. Kennard pledged that the FCC will "ensure that all

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unable to get the 1/19/99 version of the model to successfully complete one run for the Maryland C&P Company.

[6] *See* Opposition Comments at 11.

[7] *Id.*

[8] *See* "Southwestern Bell Plans Major Launch of New Lightning-Fast Service for Data, Internet Access," at http://www.swbell.com/dsl.

[9] *Id.*

[10] *See* Affidavit of Francis J. Murphy in Support of GTE's Petition for Reconsideration of the Fifth Report and Order, at ¶¶43-53.

[11] Universal Service Order at ¶250.

[12] "Chairman Kennard's Agenda for the FCC for 1999," January 7, 1999 @http//www.fcc.gov/Speeches/Kennard/Statements/stwek901.html.

Americans – no matter where they live, what they look like, what their age, or what special needs they have – have access to new technologies to take advantage of the enormous opportunity created by the communications revolution."[13] To that end, the FCC will "[p]romote the development and deployment of high-speed Internet connections to all Americans."[14] The network adopted by the Commission in the Fifth Report and Order will not allow the FCC to meet the goals delineated by Mr. Kennard.

5. AT&T states that, "[c]opper T-1 DLC is being deployed today and is by no means an obsolete technology." This statement is not consistent with previous testimony filed by AT&T in other proceedings. As stated in my December 18, 1998 affidavit, the sponsors of AT&T's cost models have stated emphatically that copper-based T-1 DLC is not a forward-looking technology.[15]

6. AT&T attempts to dismiss GTE's criticism that the Model excludes certain network costs on the grounds that GTE "identifies neither the specific costs it asserts are missing nor the methodology behind its determination that those costs should be, but are not reflected." The following missing costs fully substantiate GTE's claim.

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[13] *Id.*
[14] *Id.*

7. First, the Model includes no investment for test systems and test gear. An important aspect of providing telecommunications services is the ability to build, test, and maintain all types of network elements. Presently, the two most common systems for performing these functions are the Switched Access Remote Test System ("SARTS") and the Mechanized Line Test ("MLT") system. SARTS allows for the centralized capability to test the various segments of special service-type circuits and Unbundled Network Elements (UNEs). MLT provides extensive loop testing functions used for customer contact, screening, dispatch, and the closeout phases of trouble report handling. Both of these testing capabilities, and the centers in which they reside, are necessary in order to efficiently provide high quality telecommunications services. AT&T agrees that "testing is a network operations function that all loops must, or at least should undergo, whether provisioned for the LEC's own use or for CLECs."[16] AT&T also acknowledges that technicians should be equipped with remote access to test systems, such as SARTS and MLT, in order to complete their work in a mechanized fashion from the field.[17] Yet, the FCC Model omits any investments associated with both test systems and technician test sets, thereby understating the ILECs' testing investment requirements.

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[15] Affidavit of Francis J. Murphy, December 18, 1998, at ¶56.

[16] AT&T's Response to GTE's Data Request No. 115 in the Washington Generic Cost Proceeding, Docket Nos. UT-960369, -70, -71.

[17] Rebuttal Testimony of Bonnie R. Petti on Behalf of AT&T Communications, Washington Generic Cost Proceeding, Docket Nos. UT-960369, -70, -71, April 25, 1997, at 25.

8. Second, the FCC Model excludes the investment associated with an ILEC's present testing locations and methods of testing, and fails to include any costs associated "forward-looking" testing technology. The Model's failure to account for centralized testing investment could mean that the Model's developers assume that testing will be done manually by technicians with portable test equipment. If so, then the capital investment for this type of testing should be included in the Model. It is not. Further, if this is the case, then using a network operations factor that is less than 100% is clearly inappropriate because manual testing requires that more expenses be allocated to the labor portion of the testing procedure. If the Model is going to exclude the required investment, then labor-related expenses should be increased. Conversely, if the Model reduces the expenses associated with testing, then it must increase the investment to cover the decrease in manual labor. The Model, however, effectively "double counts" any potential savings by both decreasing costs associated with manual labor, and simultaneously ignoring laborsaving investment costs. There is no replacement testing technology modeled in the FCC Model.

9. AT&T attempts to dismiss the importance of these omitted costs by stating that they will be reflected in the Model to the extent that they are reflected in the LECs' ARMIS data.[18] The inaccuracy of this statement becomes evident when the ARMIS-based factors in the Model are reviewed.

Specifically, the network operations factor, the central office switching expense factor and the circuit equipment factor are not based on ARMIS data. Rather, they are based on the opinion of the HAI Model developers, and studies that do not apply to the state or company in question.[19] Furthermore, the ARMIS figures referenced by AT&T are expense related, and could not possibly capture the investments that are omitted from the Model.

10. Third, AT&T states that GTE has not sufficiently supported its claim that the Model fails to include the costs of "certain SS7 signaling links." However, the admission in the HAI Model Documentation that "interLATA links are excluded from the model because such links are not part of the local exchange network"[20] conclusively proves the omission of SS7 signaling links. The exclusion of these links is not consistent with other assumptions contained in the Model.

11. The FCC Model bases its switching, interoffice facility and signaling networks on the total Dial Equipment Minutes ("DEMs") that the ILECs report to the FCC. These DEM counts include intrastate DEMs and interstate DEMs,[21] which means that all traffic flowing to the interexchange carriers is included in the switch network throughput of the Model. The

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[18] Opposition Comments at 12.
[19] *See* HAI 5.0a Inputs Portfolio, Sections 5.4.6, 5.4.7 and 5.4.8.
[20] HAI 5.0a Model Documentation, Section 2.6, n.12.
[21] *See* HAI 5.0a Inputs Portfolio, Section 4.3.7 and 4.3.8.

Modelers attempt to take full advantage of all economies of scale by including this traffic.

12. Yet, when the Model sizes the STP links, it scales back the STP investment based on the number of links that must terminate on STPs.[22] By excluding certain links, the Model inappropriately reduces the STP investment. It then spreads that reduced investment over an inflated number of signaling messages, because those messages (which are based on the DEM counts) consist of all traffic on the ILEC network, including interstate traffic. This exclusion also artificially reduces the quantity of IOF transmission equipment that would be necessary to accommodate the required signaling links.

13. AT&T attempts to further dismiss GTE's assertion that not all costs are included in the Model by stating that "[t]he synthesis model's estimation of fiber placement costs includes a capitalized labor component."[23] The installation costs referred to in GTE's Petition were the installation labor costs associated with switched trunks. The installation of switched DSO level trunks requires circuit design, central office translations, and initial testing prior to the turn-up of the trunks. The labor associated with these activities is capitalized labor that is included with trunk investment. AT&T's own study provides details of the capitalized labor required to

[22] *Id.* Section 4.7.1 through 4.7.4.
[23] Opposition Comments at 13.

install trunks. The value identified in that study is $45 per trunk.[24] This investment is excluded from the FCC Model, thereby causing the Model to understate trunk-related investment.

14. AT&T correctly identified one error in my initial analysis. For the C&P Company in Maryland, I incorrectly used the line to trunk ratio computed from the Unit Costs output sheet, which was 24:1.[25] I should have computed the ratio from the quantities contained on the Investment Input sheet, which produces a line to trunk ratio just over 11:1.[26] While not as dramatic as designing only 25% of the required trunks, the correct calculation shows that the Model computes only 54% of the trunks required, and still designs a network unable to complete calls during busy periods.

15. AT&T erroneously attempts to discard pertinent issues raised by GTE, such as busy season switch and trunk design principles, by categorizing them as input issues.[27] Switch and trunk design principles are based on insuring that the network will be able to handle peak or busy hour traffic demands. The algorithms in the present version of the Model take a simplistic approach to identifying peak traffic by taking total annual traffic (total DEMs from ARMIS) and spreading the usage out uniformly. In order

[24] *See* AT&T: "A Study of AT&T's Competitors Capacity to Absorb Rapid Demand Growth," dated August 4,1989, at 7.
[25] Switched lines D66/switched trunks D77.
[26] (Total switched trunks [BS through BY minus special access {E}] /total switched lines [B-E]).

to quantify the impact of busy season traffic, peak period design objectives require a change in the Model's algorithms or an additional computation within the platform. It follows that if the algorithms in the Model are not constructed to incorporate busy season variations, then the Model cannot properly reflect switch and trunk design principles, regardless of the input values chosen.

16. AT&T contends that the Model does not violate Criterion 6 of the Universal Service Order because that criterion does not specifically address the issue of unoccupied households.[28] Criterion 6 clearly states that "[t]he cost study or model must estimate the cost of providing service for all businesses and households within a geographic region."[29] For the reasons discussed in my December 18, 1998 affidavit, the forward-looking cost model adopted by the Commission must build a network that serves all housing units, not just occupied households.[30] The North Carolina Utilities Commission concurs "that a forward-looking cost study should include all housing units."[31] The Public Service Commission of South Carolina accepted the BCPM Model rather than the HAI Model, because among other things it, "builds a network to reach all customers—existing

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[27] Opposition Comments at 15.
[28] *Id.* at 13.
[29] Universal Service Order at ¶ 250.
[30] Affidavit of Francis J. Murphy at ¶¶64-67.
[31] In the Matter of Establishment of Universal Service Support Mechanisms Pursuant to Section 254 of the Telecommunications Act of 1996, Before the North Carolina Utilities Commission, *Order Adopting Forward-Looking Economic Cost Model and Inputs*, Docket No. P-100, SUB 133b, April 20, 1998, Page 12.

and potential."[32] Similarly, the Florida Public Service Commission recently ruled that "[o]n balance, we believe that a cost proxy model for intrastate purposes should build plant to housing units, not just occupied households or households with telephone service."[33]

The Latest Release Of
<u>The Model Cannot Be Evaluated</u>

17. Like its predecessors, the most recent version of the FCC Model (released January 5, 1999) is still not complete,[34] and therefore is incapable of producing meaningful results. The Model still does not contain actual customer location data, and contains only the fictitious data for the state of Maryland. Fictitious customer location data will produce fictitious Model output that is meaningless for purposes of evaluating the Model.

18. The newest version of the Model still does not contain the algorithm for placing non-geocoded customers along roads. The absence of both actual geocoded customer location data and the inevitable non-geocoded data, coupled with the absence of this algorithm which is necessary to

[32] Proceeding to Establish Guidelines for an Intrastate Universal Service Fund, Before the Public Service Commission of South Carolina, *Order on Universal Service Cost Models*, Docket No. 97-239-C, Order No. 98-322, May 6, 1998, Page 52.
[33] Florida Public Service Commission, In re: Determination of the cost of basic local telecommunications service, Pursuant to S364.025, Florida Statutes Docket No. 980696-TP, Order No. PSC-99-0068-FOF-TP, Issued January 7, 1999, at 30.
[34] This affidavit is based on the January 5, 1999 version of the Model. For purposes of this affidavit, there was insufficient time to analyze the new version of the Model released on the FCC web site on January 19, 1999.

place customers along roads, causes the Model platform to be incomplete and not subject to evaluation.

19. The Model cannot be evaluated because the modified switching and expense modules referred to in the Fifth Report and Order are still not available for review.[35] The switching and expense modules released on the FCC web site do not include the modifications specified by the Commission in the Fifth Report and Order. These modules were last updated by the HAI Model sponsors in the January-February 1998 time frame,[36] and could not possibly include the modifications put forth by the Commission in the Fifth Report and Order, which was not released until November 18, 1998.

20. The documentation that would assist the user in understanding the assumptions and algorithms in the Model is still incomplete. The FCC has not provided any flow charts or similar documentation to assist the user in understanding the sequential flow of algorithms through the various modules in the Model.

21. Similarly, the Model documentation defines low density DLCs as having a line capacity of 96 or 24 lines.[37] Yet, when the Model is run, DLCs on fiber

[35] *See* Fifth Report and Order at ¶¶75, 81.
[36] *See* Update.zip released on the FCC web site on January 5, 1999.
[37] *See* HCPM Documentation, Section 5.2.1.

with 96 or 24 lines are counted as high density DLCs.[38] Therefore, the Model documentation is not consistent with the manner in which the Model is actually functioning.

22. The DLC investment produced by the Model cannot be fully evaluated because the line counts associated with Low Density DLC Remote Terminals (RTs) are not available to the user.[39] Since I have no idea how many customers are being served by the DLC, I cannot evaluate the DLC investment and costs.

Limited Analysis Of
The Latest Release Of The Model
Indicates It Is Still Not Working Correctly

23. My analysis of the latest version of the Model indicates that the Model is still not working correctly. As also discussed in my December 18, 1998 affidavit, the Model still arbitrarily designates feeder placement investment as copper or fiber using fixed percentages that are hard-coded in the Model,[40] assigns fiber feeder placement investment to wire centers where there is no fiber cable investment,[41] does not use standard input formats

[38] Pascal source code printout.pas (distgrid.csv)
[39] *Id.*
[40] Affidavit of Francis J. Murphy in Support of GTE's Petition for Reconsideration of the Fifth Report and Order, CC Docket Nos. 96-45 and 97-160, December 18, 1998, at ¶33.
[41] *Id.* at ¶34.

from module to module,[42] and incorrectly applies an annual carrying charge factor twice to the SAI investment.[43]

24. The newest version of the Model is still not capable of modeling the DLC modularity increments being employed by GTE today,[44] and still contains algorithmic errors that overstate the investment for SONET OC3 rings[45] and some tandem-related investment.[46]

25. Additional analysis conducted on the latest release of the Model indicates that after the Model calculates the number of High Density DLCs required, it arbitrarily multiplies the number by a factor of three.[47] This causes the number of High Density DLCs produced by the Model to be overstated.

26. The feeder material and placement costs at the cluster level are determined using the Feeder/Allocation factor.[48] This factor is arbitrary and could distort universal service support amounts at the cluster level. In order to be accurate, the Model should determine feeder material and placement costs using actual data, not an arbitrary allocation factor.

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[42] *Id.* at ¶36.
[43] *Id.* at ¶38.
[44] *Id.* at ¶37.
[45] *Id.* at ¶39.
[46] *Id.* at ¶39.
[47] Pascal source code printout.pas (distgrid.csv)

[48] Pascal source code printout.pas (feedgrid.csv)

27. The feeder distance contained in the distribution module is developed using an allocation factor.[49] The Model uses this arbitrary allocation rather than the actual feeder distances contained in the feeder module of the Model.

28. The current version of the switch module fails to properly apply the "Switch Port Administrative Fill" user-adjustable input value[50] to the per line costs of "autonomous" or "stand-alone" switches. The "Switch Port Administrative Fill" input value allows the user to vary the amount of spare switch capacity provided for maintenance, administration, load balancing, etc. The per line switching costs produced by the Model should vary based on the value of this user-adjustable input (i.e., there is an inverse relationship between the cost per line and the input value – a decrease in the value should lead to an increase in the switching cost per line). This is not the case with the switching cost per line of the "stand-alone" switches contained in the Model. When the "Switch Port Administrative Fill" input value is changed in the switching module, there is no change produced by the Model for the corresponding cost per working line for "stand-alone" switches. [51] This is an error in the Model platform that causes the Model to produce inaccurate per line costs for "stand-alone" switches.

[49] Pascal source code printout.pas (distgrid.pas) and (feedgrid.pas)
[50] *See* R50a_Switching_io.xls module released 12/17/98 on the FCC web site.
[51] BCPM sponsors ex parte presentation to the FCC on January 8, 1999.

29. The administrative fill factor error and an investment calculation error involving the "trunk port" input were identified by the BCPM sponsors in a presentation to the FCC staff. The proposal set forth by the BCPM sponsors calls for the trunk port investment to be included in the basic switch curve, and for the "Trunk Port Investment per End" to be set to zero.[52] This proposal is consistent with the position taken by GTE at the FCC Cost Model Input Workshop held by the FCC staff on December 1, 1998.[53] This solution bypasses the trunk port related algorithms in the Model and enables the Model to calculate more accurate switching investment values.

30. If the Commission adopts this approach, modifications of the switching module will be required in order to properly calculate tandem investment values. In the current version of the Model, tandem costs are calculated using the "Trunk Port Investment per End" input value.[54] If this input value is set at zero, the tandem investment for the Model will be understated. Hence, the algorithms used in the Model to calculate tandem investment must be modified if the "Trunk Port Investment per End" is set to zero. Alternatively, as the BCPM sponsors have proposed, the tandem switching inputs may be changed to include the total tandem investment, including the trunk ports. While I have not had sufficient opportunity to

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[52] *Id.*
[53] *See* Ex Parte : Universal Service – CC Docket No. 96-45 and Forward-Looking Mechanism for Non-Rural LECs – CC Docket No. 97-160 filed by GTE on December 18, 1998.
[54] *See* HAI 5.0a Model Description, Section 6.5.3.3.

fully evaluate this proposal, my initial analysis indicates that it is a reasonable approach.

Engineering Assumptions In The Model Do Not Conform To Accepted Design Standards

31. The affidavit I filed on December 18, 1998 provides extensive detail on why the Model does not comply with widely accepted engineering design standards. The criticisms are still applicable to the most recent version of the Model. As discussed in my earlier affidavit, the Model incorrectly assumes the use of an 18,000-foot maximum copper loop length[55] and obsolete copper-based T-1 technology.[56] The network designed by the Model cannot accommodate the service demands of the existing customer base,[57] and will not be able to meet the service standards mandated by state commissions.[58] Finally, the switching and interoffice network designed by the Model does not comport with engineering design standards and results in a network that will be subject to blocked calls and delayed dial tone.[59]

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[55] Affidavit of Francis J. Murphy in Support of GTE's Petition for Reconsideration of the Fifth Report and Order, CC Docket Nos. 96-45 and 97-160, December 18, 1998, at ¶¶43-53.

[56] *Id.* at ¶¶55-59.
[57] *Id.* at ¶¶60-63.
[58] *Id.* at ¶¶64-67.

32. The Model's feeder facilities are comprised of copper, fiber and digital copper feeder facilities that incorporate a choice of traditional T-1 service with repeaters or HDSL.[60] The FCC has cited an *ex parte* presentation by PairGain Technologies as its authority for the HDSL assumptions included in the Model.[61] The PairGain presentation referred to by the FCC is actually a presentation on the broader subject of xDSL, and contains very little information specific to HDSL. The limited information it does include is a copy of the PairGain PG-Flex™ price list containing list prices for one 24-channel and four 24-channel PG-Flex™ system configurations. (PG-Flex™ is PairGain's HDSL based DLC product.) Since this is the supporting documentation for the FCC's HDSL assumptions, I expected to find input values in the Model that were consistent with this supporting documentation. This was not the case. I compared the prices contained in the PairGain price chart to the default values contained in the Model, only to find that the prices in the Model are significantly less than those quoted in the PairGain *ex parte* presentation.[62]

33. The Commission in the Fifth Report and Order adopted an 18,000-foot maximum copper loop length.[63] Documentation provided by PairGain does not support an 18,000 foot maximum copper loop length, because

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[59] *Id.* at ¶¶ 68-77.
[60] *See* "The Hybrid Cost Proxy Model Customer Location and Loop Design Modules" Appendix A, page 35, December 15, 1998.
[61] *See* Federal-State Joint Board on Universal Service and Forward-Looking Cost Mechanism, CC Docket Nos. 96-45 and 97-160, *Order*, DA 98-2567, (rel. December 17, 1998), at ¶22.
[62] Prices for fixed and variable T-1 terminal costs are contained in Table 15 (fdcost.txt) of the Model.

HDSL-based DLC is not capable of providing service to subscribers beyond 10,200 feet from the Remote Terminal/SAI. The PairGain PG-Flex™ documentation states that the maximum permissible analog drop lengths (total subscriber copper distribution loop length) are 6.3 kft of 26-gauge wire or 10.2 kft of 24- gauge wire.[64] Therefore, customers served by 24-gauge distribution cable longer than 10.2 kft (beyond the HDSL remote terminal) will receive degraded service or in some cases no service. Similarly, customers served by 26-gauge distribution cable longer than 6.3 kft (beyond the HDSL remote terminal) will receive degraded service or in some cases no service. The FCC model routinely exceeds these distance limitations by virtue of the adoption of the 18,000-foot maximum copper loop length.

34. The Model also fails to properly reflect the cost differences that occur due to the design constraints of HDSL and T-1 technology. While the FCC claims that the "model is capable of using either traditional T-1 repeater technology or HDSL,"[65] it does not contain any technology specific input values or algorithms to reflect the differences in costs associated with the different technology choices. According to a PairGain product guide, costs for a two-mile T-1 connection using traditional T-1 repeater technology are nearly seven times the costs of the same construction

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[63] *See* Fifth Report and Order at ¶70.
[64] *See* PairGain PG-Flex Subscriber Carrier System Overview, Document 800-700-200-041P, June 1997, Page 8.

using HDSL technology.[66] The Model does not have the capability to capture these cost differences.

35. In addition, the Model does not have the capability to capture the cost differences due to the design constraints of the two technologies. For example, according to the PairGain documentation, HDSL terminal-to-terminal T-1 cable lengths are constrained to 9,000 feet of 26-gauge copper cable or 12,300 feet of 24-gauge copper cable.[67] Beyond those design points, doublers (repeaters) are required. The Model does not contain any input values or algorithms that capture the additional costs of providing HDSL when these design parameters are exceeded.

36. The Model's use of traditional T-1 repeater technology is also subject to the same flaws. The use of T-1 repeaters and variations in T-1 repeater spacing due to cable gauge size and the corresponding costs for T-1 repeaters are not accounted for in the terminal costs contained in the Model. The T-1 carrier repeater spacing for 24-gauge cable varies between 5,000 and 6,500 feet, depending on cable structure and types. For 26-gauge cable, the range is 4,000 to 5,100 feet.[68] The costs in the Model are the same regardless of cable length or structure type. This is

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[65] Federal-State Joint Board on Universal Service and Forward-Looking Cost Mechanism for High Cost Support, CC Docket Nos. 96-45 and 97-160, *Order*, December 17,1998, at ¶23.
[66] PairGain Product Guide, June 1997, Page 3.
[67] PairGain Technologies PG-Flex System Overview, Document No. 800-700-200-041P, March 14, 1996, Page 8.
[68] AT&T Practices, T1 Digital Line Transmission and Outside Plant Design Procedures Carrier Engineering, July 1990.

an unrealistic assumption that causes the Model to produce inappropriately low cost estimates. Since feeder cable length and structure type are determined separately for every feeder route, changing their input values cannot adequately compensate for these shortcomings in the Model platform.

I declare under penalty of perjury that the foregoing information is true and correct. Executed on this 22nd day of January 1999.

Francis J. Murphy

Subscribed and sworn before me this 22nd day of January 1999.

Notary Public

My Commission expires: June 4, 2004

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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

SUPPLEMENTAL AFFIDAVIT OF
CHRISTIAN MICHAEL DIPPON
IN SUPPORT OF GTE'S REPLY

I, Christian Michael Dippon, being duly sworn, say:

1. This affidavit supplements my affidavit filed on December 18, 1998, detailing my preliminary analysis of the model (the "Model") adopted by the Federal Communications Commission ("Commission") on October 22, 1998,[1] and released on November 17, 1998. I did not have an adequate opportunity, prior to filing the December 18 affidavit, to review versions of the Model released on December 5 and 17, 1998. I file this affidavit to describe my preliminary review of those two versions, and a subsequent version released on January 5, 1999. In addition, I briefly looked at the version released on January 19, 1999.

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[1] Federal-State Board on Universal Service; Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, *Fifth Report and Order*, CC Docket Nos. 96-45, 97-160, FCC 98-279 (rel. Oct. 28, 1998) ("*Fifth Report and Order*").

2. My review of the recent versions of the Model has not changed my initial conclusions or recommendations: the Commission should finish the Model, provide all components for full inspection, and allow sufficient time for a thorough analysis before adopting the Model for universal service funding purposes. The Commission prematurely adopted the Model in the *Fifth Report and Order* and should take appropriate action to correct this misjudgment.

The Model Still Cannot Be Fully Analyzed.

3. The latest version of the Model addressed only three of the issues raised in my December 18 affidavit: some additional model documentation and code was provided; the Model interface appears to be corrected; and the user can run the Model in non-demo mode.

4. The majority of other problems still have not been addressed. These include, but are not limited to, the absence of:

- A complete and fully documented customer location database;
- A complete, operational version of the Model (including all final modifications to HCPM, and the modules drawn from HAI);
- Complete Model documentation, including an explanation of the Model's overarching architecture;
- Fully documented source code including flowcharts; and

- A full set of default values for the user-adjustable inputs.[2]

5. As stated in my initial affidavit, the Commission must provide these items before I can meaningfully analyze the Model. All of the data and information described above is needed to perform a complete analysis, which includes, but is not limited to, the following tasks:

- External validity tests;
- Internal consistency checks;
- Comparison to ARMIS or other external data;
- Minimum Spanning Tree tests;
- Loop length comparisons;
- Switch cost comparisons;
- Line comparison;
- Customer location comparison;
- Wire center comparison;
- Inspection and validation of economic principles underlying the model;
- Inspection of switch cost curves;
- Inspection of joint and common cost approach;
- Inspection of second line approach;
- Inspection of expense treatment;

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[2] Although the Commission has chosen to separate this proceeding into two parts, a meaningful analysis is possible only when the inputs are available.

- Sensitivity analyses;
- Code inspection;
- Clustering analysis—testing of different methodologies;
- Inspection of local loop architecture layout; and
- Inspection of the treatment of the cost of capital.

6. External validity tests, which consist of comparing a model's output to actual observed data, are fundamental to any model analysis. Obviously, if the output is incomplete (*e.g.*, not all cost determinants are available or finalized), a comparison cannot be made. Consequently, the reasonableness and accuracy of the Model's output cannot be determined. Minimum Spanning Tree ("MST") comparisons have proven useful because they determine the reasonableness of the Model's distribution network. Again, if the customer location database is not available, this type of comparison cannot be performed, and I cannot draw any conclusions about the accuracy of the Model's outside plant investment.

7. The items listed above also illustrate that constant changes to the Model make a complete analysis impossible. Even if all the necessary information were available, constant changes make an analysis of no value, except for the short period when the Model is between versions.

8. Finally and most important, sufficient time to complete an analysis must be provided. A detailed analysis of a proxy cost model takes considerable time and effort. Lacking sufficient time, an analyst can perform only a cursory examination, which allows errors to remain undiscovered.

The New Versions of the Model Raise More Questions and Concerns.

9. The latest versions of the Model raise more issues. First, the ability to run the Model in batch mode improved the ability to examine the results of the cluster analysis. However, some problems with the cluster module are apparent. For instance, the "Number of Customer Locations" entry appearing in the output files seems incorrect—the result appearing there appears to pertain to the number of raster cells used in the analysis, *not* the number of customer locations.

10. In addition, it is difficult to easily determine the final raster size from the output file. Since the customer location module increases raster size when it reaches the maximum for populated cells, the raster size entered by a user is not always the raster size used in the final clustering analysis. This statistic should be readily available in the output file.

11. Further, it is not possible to reduce arbitrarily the raster size. For example, when I ran the Model for the Maryland wire center "RSSNMDXR," the Model "hangs" and stops processing when the raster size is less than 13. It is unclear why this happens since the documentation makes no mention of limits on user-input raster size.

12. The Model's long run time remains a significant problem. Based on my experience with the Model to date, even with the most powerful PCs, it takes an inordinate amount of time to run. Runs performed on the mock data for Maryland, which were provided with the Model, took approximately eight hours to complete using a Pentium II 300 MHz computer with 128 MB of RAM. This

suggests that it could take several days to run the Model completely for large states, such as California and Texas.

13. The lengthy run-time essentially prohibits sensitivity analyses. Sensitivity analyses of only one variable could take several weeks to complete. I tried to do a sensitivity analysis on a subset of wire centers. Unfortunately, I encountered problems that prevented me from completing this task. The switching, interoffice, and expense modules cannot be adjusted for a reduced serving area—a few wire centers. The Model uses ARMIS and traffic data for an entire company and further disaggregation is not possible.

14. The code for the customer location modules makes use of a variable entitled "waste lots." This variable is an example of the incomplete status of the documentation, as the documentation neither defines nor discusses this term. Thus, the analyst must interpret the code and attempt to determine its use.

15. Finally, based on the Commission's suggestion to use alternative databases[3] for preliminary analysis purposes, I ran the Model for the State of Missouri using surrogate data from PNR and then using surrogate data from Stopwatch Maps.[4] The results revealed that the two databases contain drastically different line counts for the same study areas. Consequently, universal service fund size

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[3] Federal-State Board on Universal Service; Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, *Order*, CC Docket Nos. 96-45, 97-160, DA 98-2567 (rel. Dec. 17, 1998) at ¶ 9 ("*Order*").

[4] The PNR point data, the PNR preprocessed data files (BIN files), and part of the surrogate database still are not available.

estimates are significantly different. The Model's output apparently depends greatly on the customer location database, which makes this an extremely important subject.[5]

I hereby swear, under penalty of perjury, that the foregoing is true and correct.

Christian Michael Dippon

Subscribed and sworn to before me this 22nd day of January 1999.

Pamala J. Leonard
Notary Public

My Commission Expires: May 4, 2001

PAMALA J. LEONARD
Commission # 1134420
Notary Public — California
Los Angeles County
My Comm. Expires May 4, 2001

[5] The newest version of the Model seems to contain a true up of residential and business lines at the wire center level. While this is encouraging, the choice of database still will have a significant impact on the Model output. The Model allocates different numbers of customer locations using the surrogate method depending on which database is used.