

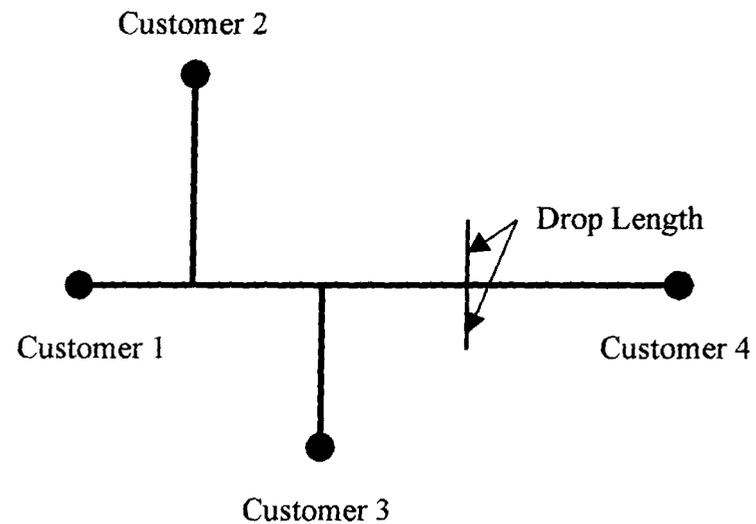
Appendix B

Outlier Cluster: 4 Location Road Cable Calculations

4 Customer Locations

C) Primary road cable length is the distance of the major axis of the cluster.

Secondary road cables are spurs of primary with a total length equal to the minor axis of the cluster.



**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF MINNESOTA**

Edward Garvey	Chair
Joel Jacobs	Commissioner
Marshall Johnson	Commissioner
Gregory Scott	Commissioner
Leroy Koppendrayer	Commissioner

IN THE MATTER OF THE STATE)	
OF MINNESOTA'S POSSIBLE)	PUC DOCKET NOs. P-999/M-97-909
ELECTION TO CONDUCT ITS OWN)	
FORWARD-LOOKING ECONOMIC)	OAH DOCKET NO. 12-2500-11342-2
COST STUDY TO DETERMINE THE)	
APPROPRIATE LEVEL OF UNIVERSAL)	
SERVICE SUPPORT)	

AFFIDAVIT OF WITNESS

I, **Richard N. Clarke**, being first duly sworn, depose and say as follows:

1. My name is Richard N. Clarke. I am a Division Manager in AT&T's Local Services and Law and Public Policy Divisions. In this position I am responsible for AT&T's economic policies related to local telecommunications services and I have directed AT&T's participation in the development of the Hatfield Model of forward looking economic costs of local exchange networks and services. I have a Bachelor's degree in mathematics and economics from the University of

Michigan, and Master's and Doctoral degrees in economics from Harvard. Prior to joining AT&T with Bell Labs in 1986, I was an Assistant Professor of Economics at the University of Wisconsin-Madison, and worked as an economist with the Antitrust Division of the U.S. Department of Justice.

2. The purpose of this affidavit is to respond to several ill-informed claims made by U S WEST that the customer location data that underlie the placement and engineering of distribution plant in the Hatfield Model 5.0 ("HM 5.0") are insufficiently open and verifiable, thus the entire model should be stricken from the Commission's consideration.

3. Before addressing the individual U S WEST allegations, it is useful to provide a correct description of the basic data used in the HM 5.0, how these data are developed, and what parties are responsible for each stage of this development.

4. Because the HM 5.0 has as its goal the modeling of distribution plant that is engineered as precisely and efficiently as possible to the locations at which customers demand telephone service, the HM 5.0 requires as input the best possible latitude and longitude data on these precise customer locations. These latitude and longitude specifications of customer geographical locations are called "geocodes." There is widespread agreement that such geocodes are superior descriptors of customer location to "surrogate" methods such as use of road locations.¹ The data sources that the HM 5.0 uses for its customer geocodes are commercially available direct mail address lists from Metromail for

¹ This is because many roads are devoid of telephone customers; telephone customers may not be located along the set of roads entered in certain limited road databases; and even when customers are located along roads, their concentration along roads is typically uneven.

residence locations, and Dun and Bradstreet (“D&B”) for business locations.² These data are obtained by the HM 5.0’s independent data vendor, PNR and Associates, through agreements that PNR has with Metromail and D&B. PNR then converts these address lists into geocode points by processing these data through a commercially available geocoding software program known as Centrus™ Desktop that is distributed by QMS Software.³ PNR continues to use only the geocodes that Centrus Desktop returns with an indicator that the location is accurate to the precise address level, and which identify the Census Block in which the geocode is located. The remaining less accurate geocodes are discarded as being insufficiently precise for current use within the HM 5.0.⁴

5. Because Metromail and D&B data contain only about 90% of all residence and business addresses, and because PNR discards those address geocodes that are not precise to the address level, this data process will typically yield geocodes for only about 70 to 75% of the total number of residence and business customer locations that are believed to exist. This geocode success fraction is computed by dividing the number of successful (or “actual”) geocodes for a unit of geography (e.g., a Census Block, a county, a state) by an estimate of the full number of customer locations believed to exist in that unit of

² The Metromail and D&B databases are described in detail in Sections 5.4.1 and 5.4.2 of the *HM 5.0 Model Description*, that has been placed into the record of this proceeding.

³ The procedures used by Centrus Desktop to convert addresses into latitude and longitude geocodes are described in Section 5.4.3 of the *HM 5.0 Model Description*. In addition, the operations manual for Centrus Desktop, which provides even fuller detail about these techniques and procedures was entered by AT&T into the public record of the FCC’s universal service proceeding (CC Dkt. No. 96-45) on December 23, 1997.

⁴ These geocodes may only have located an address accurate to a Census Block Group or a ZIP or ZIP+4 centroid.

geography. These denominator estimates are developed by PNR for residence and business locations, by Census Block, from PNR's National Access Line Model.⁵

6. The raw estimates that PNR develops from its National Access Line Model are normalized to be specific to a particular collection of wire centers, and to add up to the total business and residence line counts reported by LECs for their study areas through lists of eligible wire centers and study area line count totals provided by AT&T to PNR. These normalized "target" counts, then, become the denominator for the geocode success rate. If the number of successful geocodes for a Census Block falls short of PNR's calculated "target" number of customer locations for that Census Block, PNR creates an additional number of "surrogate" geocodes for that Census Block that are latitude and longitude pairs uniformly spaced along the Census Block's periphery. Thus, the number of "actual" geocodes plus "surrogate" geocodes for each Census Block will add up to the target number of customer locations that PNR has estimated for the Census Block.

7. Once this collection of actual plus surrogate geocodes is complete, these geocodes are associated with a serving wire center through PNR's use of BLR wire center service area data.⁶ A complete wire center's collection of customer geocodes are then processed by PNR's Spatial Clustering Module to identify naturally occurring clusters of customer locations that can be served efficiently

⁵ Indeed, U S WEST's sponsored BCPM3 Model makes use of business line counts purchased from PNR and developed from PNR's National Access Line Model.

⁶ It is my understanding that BLR data are also used by the BCPM3 for this same purpose.

from common distribution and feeder facilities.⁷ The location, the area, the relative North/South to East/West dimensions, and the line counts associated with each of these clusters are then compiled by PNR and returned to AT&T for inclusion in the input data that are used directly by the HM 5.0.

8. It is now useful to review the opportunities available to U S WEST (or any other interested party) to audit each of these stages of the HM 5.0 data development processes. As a threshold point, U S WEST does not appear to provide evidence that any of these data development steps is improperly performed, but, rather, questions the verifiability of the geocoding process. "Without this basic information, U S WEST is deprived of its opportunity to demonstrate the likely errors and deficiencies in the geocoding process and is being deprived of obtaining a fair hearing in this matter" shall now demonstrate that each of these stages is verifiable by U S WEST; and to the extent that U S WEST claims that it is not able to verify these steps, it is either because U S WEST has: (1) ignored information that has been placed on the public record; or (2) has fundamentally misunderstood how the data are developed and used by the HM 5.0; or (3) because U S WEST has failed to make a clear request for the required information to the party that can appropriately provide it to U S WEST.

Claim 1: U S WEST claims that the Metromail residential data have coverage less than that claimed by AT&T.

⁷ The source code for PNR's Spatial Clustering Module was filed with the the FCC in CC Dkt. No. 96-45 on September 30, 1997 and on January 13, 1998.

Although it is difficult to understand how U S WEST can claim both that the Metromail data are unavailable, and at the same time claim that it has found the coverage of these data to be incomplete, both statements are false. As Metromail has stated directly in a memo filed publicly with the FCC on December 23, 1997, the number of address records in their National Consumer Database is approximately 98.2 million – and not the 69 million alleged by INDETEC on behalf of U S WEST. In light of Metromail's correction of U S WEST's erroneous view of its data, it is not clear what subsequent efforts U S WEST may have made to clear up its misunderstanding of the content of the Metromail data and to obtain a complete and appropriate set of these data from Metromail.

Claim 2: U S WEST claims PNR will not provide them with the actual geocode points from the Metromail and D&B data.

9. While it is true that PNR will not provide these geocode points to U S WEST, neither does PNR provide these points to AT&T. The reason is straightforward. The address information PNR obtains from Metromail and Dun & Bradstreet is commercially valuable and provides revenues to Metromail and D&B. Thus, PNR is prohibited by these two vendors from giving their data away. Mr. William Newman, Executive Vice President of PNR, noted this concern in his letter to Mr. Steve G. Parsons, INDETEC, dated January 13, 1998. "Because of the potential negative revenue implications, our data vendors insist that we act responsibly in using their data." Furthermore these vendors' concerns are very real because U S WEST competes with Metromail and Dun & Bradstreet in the mailing list business. One need only look at the U S WEST Yellow Pages in Denver, Colorado under "Mailing Lists." Large advertisements appear for

U S WEST Marketing Resources and for Dun & Bradstreet. Metromail Corporation also has an ad.

10. These competitive concerns aside, the Metromail and D&B databases are available for use by U S WEST, but U S WEST has simply not followed the instructions in the letter from PNR to INDETEC stating that these vendors must be approached directly to seek a license to use their commercial data. Instead, U S WEST states that it has attempted to obtain this basic information from PNR and the Hatfield Sponsors. These entities do not have a right to distribute these data – and in the case of the Hatfield Sponsors, do not even have access to these raw data themselves. U S WEST has not alleged that it approached Metromail and D&B to obtain the basic information and that Metromail and D&B have refused to provide the information after U S WEST executes an acceptable proprietary agreement and pays the requisite sum. Thus, U S WEST has not made any showing that the information is not available from the proper owners of these data.

11. Furthermore, U S WEST may not even need to secure access to the raw data to receive the information it deems essential. Based on further processing, PNR has now been able to develop geocode rate statistics by density zone for each of the 52 state jurisdictions that the HM 5.0 models.⁸ For Minnesota these results are:

⁸ These geocode rate data have been filed publicly by MCI with the FCC in CC Dkt. No. 96-45 on February 3, 1998.

Density Zone	Geocode Pct
0 – 5	8%
5 – 100	44%
100 – 200	77%
200 – 650	84%
650 – 850	88%
850 – 2550	91%
2550 – 5000	92%
5000 – 10,000	91%
10,000 +	87%
Average	76%

If U S WEST believes that this level of granularity is insufficient, and that it needs to determine the counts of actual geocoded customer locations individually by Census Block, it must acquire commercially the requisite residential and business addresses from Metromail and D&B, and the Centrus Desktop geocoding software from QMS. With these data and software in hand, U S WEST can develop these counts in the same fashion as PNR – or may request PNR to perform these processes.

12. Similarly, U S WEST may develop an appropriate set of “target” location counts by Census Block to serve as the denominator in its calculations of geocode percents. As PNR indicated in its letter to INDETEC, PNR will sell its unnormalized National Access Line Model outputs to any interested party. Purchasers may either provide PNR with their own list of eligible wire centers and total line counts by study area for normalization purposes; or in the alternative, provide PNR with the same values for these data items as provided by AT&T to PNR for use in the HM 5.0.⁹ In any event, if U S WEST is unsure

⁹ U S WEST may develop these normalization data by examining the input database provided on the HM 5.0’s CD-ROM. This database contains the list of eligible wire centers used in the HM 5.0, and also contains the line count totals by type for each study area that were used by PNR to normalize counts to HM 5.0 specifications.

how to proceed in this regard, the best way to proceed is to take PNR up its good faith offer to work with them to develop the data that U S WEST requires. If U S WEST chooses to work in this fashion, and to obtain from the data vendors appropriate use licenses for their data, U S WEST would be able to develop and analyze specifics of the data that have not even been available to AT&T -- because AT&T is not a direct licensee of the granular Metromail and D&B data. What is key to note, is that it is incumbent upon U S WEST to seek access to the different data sources used in the HM 5.0 from the party who has authority to grant it. U S WEST was misguided in trying to gain access to the D&B and Metromail data through PNR, and similarly misguided in trying to gain access to the inputs that AT&T provided to PNR through PNR. A simple request to the party that originated the particular data item would have been the most availing.

13. In this regard, it is useful to draw an analogy to the openness with which certain input data used by U S WEST's BCPM3 model are available. It is my understanding that the BCPM3 uses terrain data from Stopwatch Maps, and processes these data through MapInfo programs, to develop the average terrain characteristics associated with each wire center. It is also my understanding that U S WEST will not provide these data and software programs to any interested party. Rather, should AT&T wish to verify BCPM3's process, it would have to approach Stopwatch Maps to purchase the base terrain data, and purchase the MapInfo software to process these data -- as these data and software programs are not in the public domain.¹⁰

¹⁰ Perhaps less open to potential public view are the Bellcore SCIS or U S WEST SCM models that BCPM3 relies on to develop its switching costs. Furthermore, AT&T has been unable to ascertain any avenue for determining the values of the proprietary input parameters that U S WEST and the other BCPM3 sponsors' have chosen to insert into these closed models.

14. It is also instructive to note that while the HM 5.0 Sponsors' have made available granular statistical information about the success of their customer geocoding over 468 different state/density zone geographical units across the U.S., I am unaware that BCPM3 has made public any analogous information about the success of its customer location process. It certainly would be useful for BCPM3 to state (a) the number and percent of actual customer locations that are located along the roads that are mapped in the BCPM3 model; (b) a statistical measure indicating how evenly these actual customer locations are dispersed along these roads; (c) the number and percent of actual customer locations that are located within the "road-reduced square" where the BCPM3 lays its distribution plant; and (d) the percent of all road mileage mapped in the BCPM3 model that falls within the "road-reduced square" where the BCPM3 lays its distribution plant. The provision of these statistics on a national basis, by state, and by density zone within each state would add usefully to an informed debate over the relative merits of each of the models.

15. Finally, the use of Metromail and D&B data within the HM 5.0 to determine actual customer geocodes is because the HM 5.0 Sponsors' believe these to be the best current publicly available data. To the extent that the LECs maintain lists of addresses of the locations to which they provide telephone service – or the actual geocodes of these locations, the HM 5.0 Sponsors' would be pleased to substitute this source of customer geocodes for the sources now used. Indeed, the HM 5.0 Sponsors' expect that Commissions will order LECs that seek to be eligible to receive universal service support to make available any data that they might have in this regard to improve the accuracy of the cost modeling process. Similarly, to the extent that the LECs have data superior to

that developed by the PNR National Access Line Model on the number of lines by type that are demanded by customers in each specific Census Block and wire center, the HM 5.0 Sponsors' also would expect that Commissions would order LECs that seek to be eligible to receive universal service support to make available any such data to improve the accuracy of the cost modeling process.

FURTHER AFFIANT SAYETH NOT.

Respectfully submitted this _____ day of February, 1998.

By: _____
Richard N. Clarke

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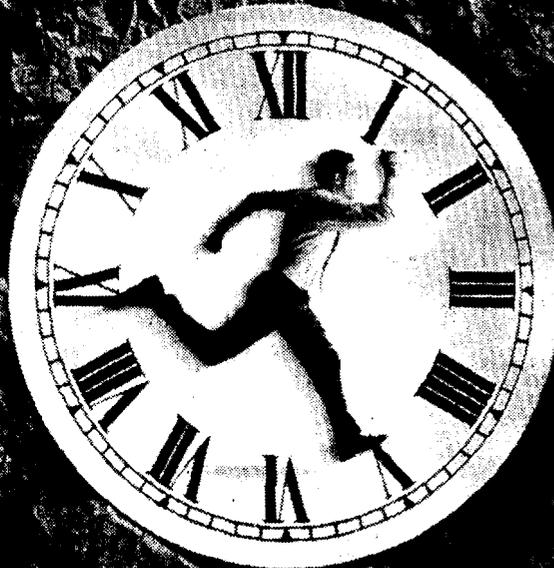
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