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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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

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

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August 13, 2001

TABLE OF CONTENTS

Page

I. INTRODUCTION AND SUMMARY 1

II. WHILE CONVERSION TO DELPHI REPRESENTS AN IMPROVEMENT OVER TURBO PASCAL, THE BETTER APPROACH IS TO CONVERT THE COST MODEL TO VISUAL BASIC 2

III. THE COMMISSION MUST MAKE CERTAIN MODIFICATIONS TO THE MODEL BEFORE USING IT TO CALCULATE SUPPORT AMOUNTS FOR 2002 4

A. The Commission Must Thoroughly Examine The Results Of The Model, Ensure That It Is Operating As Intended, And Provide More Complete Documentation Of Any Changes To The Model 5

B. The Commission Should Modify The Methodology Used To Compute Special Access Lines, Which Currently Greatly Understates The Cost Of Providing Service 7

C. The Commission Should Fix The Model's Sizing Of Serving Area Interfaces 8

D. The Commission Should Act On Sprint's Petition For Reconsideration Regarding Updated Customer Location And Road Data 10

IV. CONCLUSION 11

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BellSouth Corporation ("BellSouth"), Qwest Communications Inc. ("Qwest"), and Sprint Corporation ("Sprint"), collectively the "Joint Commenters," hereby submit their Comments in response to the *Public Notice* issued by the Common Carrier Bureau ("Bureau") regarding changes to the Synthesis Model ("cost model" or "model").[1]

I. INTRODUCTION AND SUMMARY

In the *Public Notice*, the Bureau seeks comment on the relative merits of the Delphi version of the model compared to the current version in Turbo-Pascal language, as well as whether the Federal Communications Commission ("Commission") should use the Delphi version for purposes of calculating universal service high cost support amounts for 2002. In addition, the Bureau requests recommendations concerning improvements to the Delphi version.[2]

The Joint Commenters support the Bureau's efforts to improve the cost model and particularly to convert the model into a more up-to-date programming language. While

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

[2] *Id.* at 1.

translation of the model into the Delphi language represents an improvement over the current use of Turbo Pascal, even more benefit could be gained from translating the entire cost model into the Visual Basic programming language. In addition, the Joint Commenters have discovered that some of the cost estimates generated by the Delphi version of the model vary widely from the results of previous versions of the model. The Joint Commenters have not yet been able to identify the cause of these variations. These issues must be thoroughly investigated and explained before the Commission uses the new version of the model for calculating universal service support amounts. Finally, the Joint Commenters recommend a number of improvements to the model that should be implemented for determining support amounts for 2002.

II. WHILE CONVERSION TO DELPHI REPRESENTS AN IMPROVEMENT OVER TURBO PASCAL, THE BETTER APPROACH IS TO CONVERT THE COST MODEL TO VISUAL BASIC

In the current version of the Synthesis Model, certain portions of the model are programmed in Turbo Pascal and the remaining parts of the model are programmed in Visual Basic.[3] The Joint Commenters have long contended that Turbo Pascal is an obsolete computer programming language that makes it difficult, if not impossible, to examine the flow of logic within the cost model and verify its results. Translation of the Turbo Pascal modules into Delphi would at least partly address these concerns. In particular, Delphi allows a user to step through the source code line-by-line, examining the values of various variables, which aids in understanding the logic of and identifying errors in the model. Also, because Delphi is a supported programming language, albeit with second-tier popularity, it is more likely to be compatible with future versions of Windows and other software. Thus, given a choice between

[3] Both parts of the model utilize Excel spreadsheets. Such spreadsheets will continue to be part of the model regardless of which programming language is used.

only Turbo Pascal and Delphi, the Joint Commenters would support translation of the model into Delphi.

However, the choice need not be limited to these two computer languages. While the use of Delphi in the model is an improvement over Turbo Pascal, it has at least two significant shortcomings that create inefficiencies and unnecessary complexity in the use of the model. First, conversion of the Turbo Pascal modules to Delphi would retain the use of two programming languages, because the other parts of the model would remain in Visual Basic. This use of multiple languages adds to the complexity of the model and makes it difficult to trace the flow of logic from one module to another. This problem is compounded by the use of different names for the same variables from module to module. The use of two languages (*i.e.*, Turbo Pascal and Visual Basic) in the model can be traced to the creation of the model as a "synthesis" of the various models on the record at that time. While the Commission's schedule at that time may not have allowed for the true integration of the various components when the Synthesis Model was created, there is no similar time constraint that prevents the Commission from converting the model into a single programming language today.

Second, Delphi is not nearly as widely used as Visual Basic. Delphi has not generally been used in the development of cost models submitted to the Commission or state commissions. All of the commonly used cost models, such as HAI, BCPM, BSLTM, and Qwest's TELRIC model, are written in Visual Basic.[4] As a result, the adoption of the Delphi version will impose significant expense on those who use the Synthesis Model, including the staffs of state commissions, in order to purchase Delphi software packages and train personnel to use the language.

Both disadvantages to using Delphi could be avoided by conversion of the Turbo Pascal portions of the model to Visual Basic. Visual Basic has been used in universal service cost models since at least 1996. Since that time, the parties to this proceeding have developed considerable expertise in using Visual Basic for modeling purposes. Adoption of Visual Basic for the entire model allows users to capitalize on this investment in expertise, and facilitates understanding of the model by both computer programmers and non-programmers alike. As its name implies, Visual Basic programming code is relatively easy to follow, even for individuals without a computer programming background. Thus, conversion of the entire model to Visual Basic would bring the Commission closer to its goal of adopting a model that allows parties efficiently to verify the assumptions and engineering principles used in the model.[5] As a final matter, such a conversion is possible. Qwest has created a Visual Basic version of the Synthesis Model, which it is submitting to the Commission.[6] For all these reasons, the Commission should use a Visual Basic version of the cost model for the purpose of calculating universal service support in 2002.

III. THE COMMISSION MUST MAKE CERTAIN MODIFICATIONS TO THE MODEL BEFORE USING IT TO CALCULATE SUPPORT AMOUNTS FOR 2002

In a recent decision, the U.S. Court of Appeals for the Tenth Circuit upheld the Commission's delegation of authority to the Common Carrier Bureau to ensure that the model

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[4] While substantially written in Visual Basic, certain parts of BellSouth's BSLTM are written in other commonly-used programming languages.

[5] *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, *First Report and Order*, 12 FCC Rcd. 8776, 8915 ¶ 250(8)-(9) (1997), *aff'd in part*, *Texas Office of Public Utility Counsel v. FCC*, 183 F.3d 393 (5th Cir. 1999); *cert denied, Celpage, Inc. v. FCC*, 120 S. Ct. 2212 (May 30, 2000), *cert. denied, AT&T Corp. v. Cincinnati Bell Tel. Co.*, 120 S. Ct. 2237 (June 5, 2000), *cert. dismissed, GTE Service Corp. v. FCC*, 121 S. Ct. 423 (Nov. 2, 2000).

[6] Qwest is submitting a beta version of the Visual Basic model under separate cover.

platform operates as described in the *Fifth Report and Order*.[7] The changes discussed below are essential to ensure that the model operates as described in that *Order*.

A. The Commission Must Thoroughly Examine The Results Of The Model, Ensure That It Is Operating As Intended, And Provide More Complete Documentation Of Any Changes To The Model

In running the Delphi version of the model on the Commission's Website, the Joint Commenters have found that this version generates some cost estimates that vary significantly from the results of earlier versions of the model. At this point, the Joint Commenters have not been able to determine the exact cause of these variations. For example, the Joint Commenters have been unable to determine whether changes in investment estimates at a wire center level (that is, changes from results produced by previous versions of the model) are attributable to changes in line counts produced by the revised true-up mechanism included in the new version of the model. For certain areas, and specific companies, the Joint Commenters have found that there is a significant statistical correlation between changes in line counts and changes in investment. For other areas, no such statistical correlation exists despite the fact that both sets of values changed from one model version to another. For still other areas, the correlation exists but is negative instead of the expected positive result. The Commission has an obligation to investigate these issues thoroughly and ensure that the model is operating as intended.

In addition, the Commission should provide more detailed documentation regarding changes to the model. Although the documentation available on the Commission's Website has improved over time, it still lacks sufficient detail for parties to determine without significant effort the exact changes that have been made and the reasons for those changes. On June 13,

[7] *Qwest Corp. v. FCC*, No. 99-9546, slip op. at 34 (10th Cir. Jul. 31, 2001) (citing *In the Matter of Federal-State Joint Board on Universal Service; Forward-Looking Mechanism for High Cost*

2001, the Commission staff posted a new version of the model on the Commission's Website. According to the History.Doc document on the Website, the June 13 version includes numerous changes besides the conversion to Delphi. While some of these changes are explained in sufficient detail, others are not. For example, a change in the cluster module to the methodology for truing up line counts is described as follows:

> The method of truing up line counts has been modified so that both residential and business lines are trued up correctly in all situations in which either residential or business locations are missing in the customer location data (".IN" files), or when the number of business locations is less than the reported number of single line business lines in the LineCount database. In previous versions, any incompatibility between customer location data and the line count database caused all true-ups to be turned off.

While this description gives some indication of the functional change that was made in the model, it does not explain how this change was implemented. As a result, the industry parties must examine the computer code line-by-line to try to determine exactly what has changed in the model. Only at that point – after it has painstakingly reconstructed the changes that have been made in the model – can a party assess whether the change is working as intended. At a minimum, the Commission should identify in detail the problem that was fixed and which lines of code have been modified. In addition, the Commission should explain how this code has been modified.

Given the Commission's limited resources, it is in the Commission's interest to facilitate assistance from industry participants in examining the model, identifying technical bugs, and developing improvements. The small investment in time required to better document such changes will be more than repaid in greater participation and assistance from industry participants.

Support for Non-Rural LECs, CC Docket No. 96-45, *Fifth Report and Order*, 13 FCC Rcd. 21323, 21329 ¶ 13 (1998) (*"Fifth Report and Order"*)).

B. The Commission Should Modify The Methodology Used To Compute Special Access Lines, Which Currently Greatly Understates The Cost Of Providing Service

Regardless of which version of the model the Commission decides to use for determining support amounts in 2002, the Commission should modify the methodology used to compute the number of special access lines used in the model. As outlined in a recent ex parte submission by BellSouth, the model's conversion of special access channel equivalents to physical facilities in one part of the model, but not another, results in a significant understatement of cost.[8] The Commission must modify the model to eliminate this mismatch, which clearly prevents the model from operating as it was intended when adopted by the Commission and results in a significant understatement of cost.

The model understates the cost of providing service because of a faulty computation of investment per line. In computing investment, the HCPM portion of the model generally uses ARMIS data to compute special access demand. In ARMIS, special access demand is reported as DS0 equivalents rather than physical facilities.[9] Because ARMIS does not identify the ratio of DS0s and DS1s in a study area, the model converts the total DS0 demand (reflected in channel equivalents) into estimates of the physical DS1 and DS0 components necessary to meet this special access demand. In doing so, the model assigns one copper pair per DS0 and two copper pairs per DS1. The model makes no adjustments for DS3s and higher bandwidth circuits.

Once investment is computed, the HAI portion of the model calculates investment per line by dividing investment by estimated demand (*i.e.*, the number of lines served). In estimating

[8] *See* Letter from Whit Jordan, BellSouth, to Magalie R. Salas, FCC (June 14, 2001) ("*BellSouth Ex Parte*"). For convenience, a copy of the *BellSouth Ex Parte* has been attached to these Comments as Attachment A.

[9] For example, a DS1 is reported as 24 DS0 channel equivalents, and a DS3 is reported as 672 DS0 channel equivalents.

demand (the denominator), however, the HAI portion of the model does not convert the ARMIS special access channel equivalents to physical facilities, as was done to compute investment (the numerator). This mismatch in the numerator and denominator results in the investment calculated by the HCPM portion of the model being divided by a much greater number of lines than were used to calculate that investment. As discussed in the *BellSouth Ex Parte*, this error results in a significant underestimation of cost.

> It is imperative that the Commission eliminate this mismatch in the model. If the Commission is going to use ARMIS data in the model to estimate special access lines, it must use a consistent methodology throughout the model for converting from channel equivalents to physical facilities. Until the model is modified in this manner, the Commission should instead use a nationwide estimate of special access demand as a ratio of overall business line demand.[10]

C. The Commission Should Fix The Model's Sizing Of Serving Area Interfaces

The Joint Commenters urge the Commission to address flaws in the model's sizing of serving area interfaces ("SAIs"). In particular, the model currently assumes that SAIs have more than twice their true capacity. In the *Tenth Report and Order*, the Commission stated that the model's computation of SAI investment was based on data provided by the BCPM sponsors and subsequently by Sprint individually, as well as the HAI sponsors.[11] All of these parties, as well as the industry as a whole, size SAIs based on the total number of pairs that enter and leave an SAI. Thus, for example, a 2,400 pair SAI is required to serve 1,200 end user lines. In the *Tenth Report and Order*, the Commission agreed.[12] Nevertheless, Qwest's analysis indicates that the model still sizes an SAI based on the number of pairs entering the SAI without allowing for any pairs leaving

---

[10] *See BellSouth Ex Parte* at 2.

[11] *In the Matter of Federal-State Joint Board on Universal Service; Forward-Looking Mechanism for High Cost Support for Non-Rural LECs*, *Tenth Report and Order*, 14 FCC Rcd. 20156, 20264-65 ¶ 251 (1999).

[12] *Id.* at 20270 ¶ 266.

the SAI. Thus, the model would assume that a 1,200 pair SAI is required to serve end user customer lines.[13] As a result, the model incorrectly assumes that SAIs have double their true capacity, resulting in a dramatic underestimation of the cost of providing service.

In addition to choosing an SAI with half the correct capacity, the model also selects SAIs that are one size too small for the number of lines they serve. In investigating this problem, Qwest created a hypothetical cluster with a single lot containing 2,401 lines. The test was designed so that the model did not utilize any special access channels, so that 2,401 pairs of distribution and 2,401 pairs of feeder cable were placed by the model.

In this test, the model should have deployed an SAI of sufficient capacity to ser ve all 2,401 lines of feeder and 2,401 lines of distribution. Otherwise, the network could not provide dial tone to all the designated customers in the hypothetical. The smallest SAI capable of serving a total of 2,401 customers, with a total of 4,802 feeder and distribution pairs, is a 5,400 pair SAI. Even if it were correct for the model to size an SAI solely on the number of feeder lines (and ignoring the distribution lines), one would expect the model to have employed a 3,600 pair SAI in this test.

Instead, the model deployed a 2,400 pair SAI. This error understated the required investment by $8,767. In almost every instance, the model appears to be placing an SAI that is both half the required capacity and then one size too small as well. The Commission should fix these problems before deploying a new version of the model.

[13] In other words, the model would inappropriately use the input cost for a 1,200 pair SAI, rather than a 2,400 pair SAI, in estimating the cost of serving 1,200 end user lines.

D. The Commission Should Act On Sprint's Petition For Reconsideration Regarding Updated Customer Location And Road Data

The Joint Commenters also urge the Commission to act on Sprint's pending Petition for Reconsideration ("Petition") of the *Order* updating line count input values for the year 2001.[14] In its Petition, Sprint asked the Commission to update road data and customer location data used in the model as well as line count data, to ensure that the model is used in the manner in which it was intended, and also to ensure that the model produces accurate cost estimates.

Sprint pointed out two key errors the Commission made in reaching its decision to update only line counts: (1) the Commission incorrectly assumed that if new customer locations were built along existing roads, the model already built plant to those locations; and (2) the Commission completely ignored the existence of new customer locations along new roads, to which the model builds no plant at all. Both of these errors, addressed at length in Sprint's Petition, cause the model to estimate incorrectly the costs of building outside plant to all customers. By updating line counts without updating road data and customer location data, the model distorts its cost estimates by simply applying additional lines to existing customer locations.

As the Petition explained, because of the way the customer location data is used in the model's pre-processing and clustering stages, customer location and road data actually have a greater impact on costs than do line counts:

- Line counts determine the size of cable to be used, but customer location and road data determine the actual layout of cable.
- Line counts determine the size of digital loop carriers ("DLCs"), but customer location and road data determine the number of DLCs required.

[14] *In the Matter of Federal-State Joint Board on Universal Service, Order*, 15 FCC Rcd. 23960 (2000). Sprint's Petition for Reconsideration was filed on Jan. 26, 2001.

- Line counts play a part in the clustering process, but customer location and road data actually determine the number and size of the clusters created.

The Joint Commenters believe that the Commission, in the course of addressing other model-related issues such as programming language, should take this opportunity to address this obvious inconsistency.

IV. CONCLUSION

For the reasons discussed above, the Commission should adopt the positions advocated in these Comments.

Respectfully submitted,

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August 13, 2001

ATTACHMENT A

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June 14, 2001

EX PARTE

Ms. Magalie R. Salas
Secretary
Federal Communications Commission
The Portals
445 12th Street, SW
Washington, DC 20554

Re: CC Docket No. 96-45

Dear Ms. Salas:

On June 12, 2001, Jim Stegeman, Bob McKnight and the undersigned, all representing BellSouth, met with Katie King, Bryan Clopton, Eric Einhorn, and Tom Buckley of the Common Carrier Bureau's Accounting Policy Division and Bill Sharkey of the Office of Plans and Policy in connection with the above referenced proceeding. At this meeting, BellSouth explained how the FCC's Synthesis Model understates the loop cost used in determining universal service support requirements by 9 percent in Georgia. The attached presentation was used in this meeting.

For most non-rural companies, the Synthesis Model, uses ARMIS data for special access demand. In ARMIS, the special access demand is reported as DS0 channel equivalents (e.g. 1 DS1=24 DS0s, 1 DS3=672 DS0s). The HCPM portion of the Synthesis Model converts the total DS0 demand into estimates of the components made up of DS1 demand and DS0 demand. The Model makes no adjustments or recognition for DS3 and higher bandwith circuits. To size the network facilities, the HCPM then converts the DS0 demand and the derived DS1 demand to a required number of pairs (1 pair per DS0 and 2 pairs per DS1). In calculating the investment per line, the HAI portion of the Synthesis Model makes no corresponding adjustment to total demand for the special access channel equivalents. This oversight results in the investment of the copper network being inappropriately divided by a greater number of lines than the number of lines that actually drive the cost. For BellSouth in Georgia, this oversight results in an overstatement of special access demand in the Synthesis Model of nearly 700 percent.

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List A B C D E

A way to immediately provide a short-term correction to these problems (the HCPM does not adjust for the DS3 and above demand and the fact that the HAI portion of the Synthesis model inappropriately spreads the cost of the copper network to DS0 equivalents) is to let the Model derive the special access demand based on the business line demand. If the HCPM database is not populated with special access demand, the model uses a default ratio to calculate the demand. The default ratio in the model is now 13 percent. That is, for every 100 business lines, the model would add 13 special access lines. This default value is very close to what BellSouth reported as the ratio of special access pair equivalents to business lines in Georgia which was 12 percent.

Please call me if you have any questions.

Yours truly,

W.W. Jordan
Vice President - Federal Regulatory

Attachment
cc: Bryan Clopton
Eric Einhorn
Katie King
Bill Sharkey
Tom Buckley

Q

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Synthesis Model
Special Access Line Issue

Presented by

BellSouth Telecommunications

June, 2000

Q

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- The Synthesis Model ("SM") relies upon the ARMIS reported value for channel equivalents. This ARMIS value includes DS0 circuits, 4-wire circuits, DS1 circuits, and circuits of bandwidth greater than a DS1 (DS3, OC1, etc.)
- The SM's use of special access channels leads to multiple distortions for modeling purposes.

Q

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1. The special access line penetration of business lines is an assumed constant across the state based on the count of business lines at each site.
2. The use of channel equivalents leads to a distortion and overstatement of the requirements for the total number of copper lines.
3. The HAI portion of the SM makes <u>no adjustment of the channel equivalents when it determines the per line costs.</u>

***Implication**: The result in the SM is an inconsistent use of inputs and an understatement in investment per line and universal service cost*

ARMIS Data

- Instructions for filling out ARMIS 43-08 Table 3

  "Digital Special Access Lines (Non-Switched) (64 kbps or Equiv.) - The number of 64 kbps or equivalent digital special access lines terminated at the customer location. Where DS-3 or DS-1 service is provided without individual 64 kbps circuit terminations, multiply the number of DS-3 terminations by 672 and the number of DS-1 terminations by 24 when calculating the value for this column. In the above calculation, only use those DS-1's and DS-3's for which the customer is billed. Do not double count 64 kbps circuits associated with DS-1 service where the 64 kbps circuits are customer-derived."

Implication: *ARMIS is populated with channel equivalents for special access lines*

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HCPM

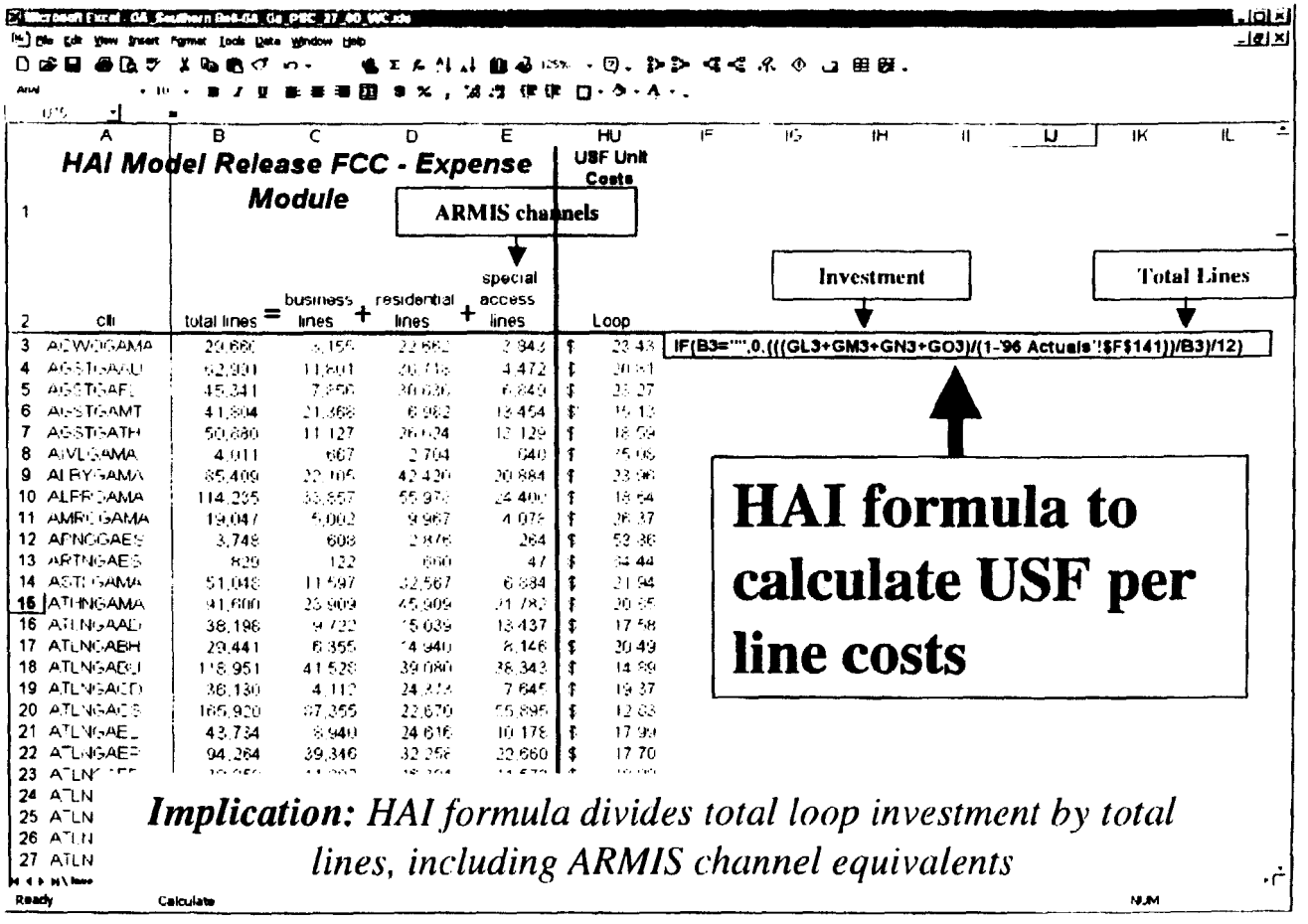
- HCPM's Distrib.Pas attempts to adjust for the ARMIS channel equivalent data.

```
lines^[i,j] :=
     GR^.ResLines[i,j]
   + (one - pct_ds1)*GR^.buslines[i,j]/(one + SpclAccessRatio)

   + pct_ds1 *GR^.buslines[i,j]*(PairsPerT1System/ChannelsPerT1System)
       /(one + SpclAccessRatio)

   + (one - pct_lsa)*SpclAccessRatio*GR^.buslines[i,j]/(one + SpclAccessRatio)

   + pct_lsa *SpclAccessRatio*GR^.buslines[i,j]*(PairsPerT1System/ChannelsPerT1System)
       /(one + SpclAccessRatio);
                                                        { special access DS1 }
```

Pct_lsa = user specified percent of special access lines that are DS1	: default is 8.25%
SpclAccessRatio = Percent of total lines that are special access	: ARMIS channels / (business lines + Armis channels
Buslines = Number of total business lines, including specials	: Business lines + ARMIS channels
PairsPerT1System = User specified value	: default is 2
ChannelsPerT1System = User specified value	: default is 24

Implication: *HCPM adjust for constant DS1 penetration but does not adjust for DS3 and higher channels in ARMIS data*

- HAI portion makes no adjustment of the channel equivalent Special Access lines



HAI Model Release FCC - Expense Module

ARMIS channels

Investment

Total Lines

2	cli	total lines =	business lines +	residential lines +	special access lines	USF Unit Costs Loop
3	ADWDGAMA	20,666	6,155	22,662	2,843	$ 23.43
4	AGSTGAAU	62,901	11,601	26,716	4,472	$ 30.51
5	AGSTGAFL	45,341	7,856	30,636	6,849	$ 23.27
6	AGSTGAMT	41,904	21,468	6,982	13,454	$ 15.13
7	AGSTGATH	50,880	11,127	26,624	12,129	$ 18.59
8	AIVLGAMA	4,011	667	2,704	640	$ 25.06
9	ALBYGAMA	85,409	22,105	42,420	20,884	$ 23.96
10	ALFRGAMA	114,295	33,857	55,976	24,400	$ 18.54
11	AMRCGAMA	19,047	5,002	9,967	4,079	$ 26.37
12	APNGGAES	3,748	608	2,876	264	$ 53.36
13	ARTNGAES	829	122	660	47	$ 34.44
14	ASTLGAMA	51,048	11,597	32,567	6,884	$ 21.94
15	ATHNGAMA	91,600	23,909	45,909	21,782	$ 20.55
16	ATLNGAAD	38,196	9,722	15,039	13,437	$ 17.58
17	ATLNGABH	29,441	6,355	14,940	8,146	$ 30.49
18	ATLNGADU	118,951	41,528	39,080	38,343	$ 14.99
19	ATLNGACD	36,130	4,112	24,373	7,645	$ 19.37
20	ATLNGACB	165,920	87,355	22,670	55,895	$ 12.88
21	ATLNGAEL	43,734	8,940	24,616	10,178	$ 17.99
22	ATLNGAEP	94,264	39,346	32,258	22,660	$ 17.70
23	ATLN					
24	ATLN					
25	ATLN					
26	ATLN					
27	ATLN					

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HAI formula to calculate USF per line costs

Implication: *HAI formula divides total loop investment by total lines, including ARMIS channel equivalents*

- Consider the following example,
  - Three business customers are housed together in a single structure
  - The structure has a single building terminal served via aerial copper distribution
  - The distribution cable is supported on poles

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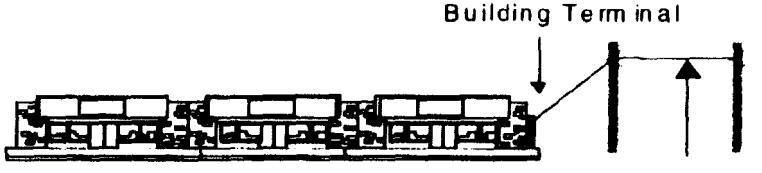

Service Rcvd.	1-DS1	1-POTS	1-POTS	Distribution Cable
DS0 Equivalence	24	1	1	← Reported in ARMIS
Copper Pairs	2	1	1	

Services Provided:

Equivalent to 26 DS0

Provisioned over 4 Copper Pairs

• Costing based on Pair Equivalents

Network Investment Calculation Based Upon Copper Pairs
(Illustrative numbers)

	Units	Investment/unit	Total Investment
25 Pair Building terminal (typical minimum)	1	$216.00	$216.00
25 Pair Distribution Cable (typical minimum)	100'	$1.53/foot	$153.00
Pole	2	$200	$400.00
Total			$769.00
Investment per Pair			$769.00 / 4 pairs = **$192.25**

Economics of Loop

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- Costing based on Pair Equivalents
  - The resulting value of $192.25 does reflect the economies of having the DS1 customer available to share the investments in poles, building terminal, and distribution terminal.

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- Costing based on Channel/DS0 Equivalents

Network Investment Calculation Based Upon DS0s
(Illustrative numbers)

	Units	Investment/unit	Total investment
25 Pair Building terminal (typical minimum)	1	$216.00	$216.00
25 Pair Distribution Cable (typical minimum)	100'	$1.53/foot	$153.00
Pole	2	$200	$400.00
Total			$769.00
Investment per DS0			$769.00 / 26 DS0s = **$29.58**

Example of Issue

- Costing based on Channel/DS0 Equivalents
  - By using this DS0 technique, the HAI portion of the Synthesis Model would apportion only about 4% ($29.58—$769.00/26 DS0) of the total investment in this section of the copper network to each POTS line (since the SM would be dividing total investment by 26 DS0s) even though each POTS line represents 25% ($192.25--$769 / 4 Cu pairs) of the copper pairs in use.

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Example of Issue

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- Now consider if, instead of a DS1, a DS3 existed at the site in the previous example.
  - The SM would model the placement of at least a 400 pair building terminal and at least a 300 pair cable
    - To arrive at the copper pair requirements, the HCPM assumes that 91.75% of the 672 special access channel equivalents are from a DS1s and that the remainder are DS0 equivalent services. It then assumes that the channels for the DS1s are provisioned over 2 copper pairs. Therefore, the HCPM assumes 107 pairs are needed for the 672 DS0s. To this 107, we add in the 2 copper pairs for the POTS services to arrive at 109 total pairs.
    - The 400 building terminal is selected to accommodate the 218 minimum pair requirement which is the result of the 109 copper pairs multiplied by 2 to accommodate for in and out pairs
    - The 300 pair cable would be selected to accommodate the 218 minimum pair requirement based a 109 copper paris adjusted for cable sizing factor of 50%.
  - Moreover, the model would divide the resulting total copper network cost by 674 to arrive at a per service cost--all for the need of 2 POTS services.

State Impact

- Georgia comparison
  - Actual BellSouth line counts compared to Synthesis Model which is based on the ARMIS data

	Actual BellSouth (in millions)	SM *(based on PNR/ARMIS)* (in millions)	% difference
Residential Lines	**2.662**	**2.666**	**(0.3)%**
Business Lines	**1.371**	**1.367**	**0.1%**
Special Access	**0.162 (pairs)**	**1.290 (channels)**	**696.4%**
Total	**4.195**	**5.323**	**26.9%**

[illegible]

- Georgia comparison
  - Making comparison runs based on these line inputs, the loop portion of the cost per line is biased downwards by almost 9% by including the ARMIS channel equivalents
  - The results are based upon runs with
    - BellSouth's cost inputs,
    - Benchmark revenue approach (model default 31/51), and
    - Wire Center level reporting

Implication: *SM's results are distorted by use of ARMIS channel equivalent data.*

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- Georgia comparison
  - The SM uses a default ratio 13% (ratio of special access to business lines) to derive special access line counts if the HCPM database is not populated with ARMIS data for a particular operating area
  - This default is more consistent with an evaluation of special access pair equivalents than it is with the actual ARMIS count of <u>derived</u> special access channel equivalents
    - The current ARMIS count of special access derived channel equivalents in Georgia is almost 95% of the switched business lines
    - This ratio based on the BellSouth actual special access copper pair equivalents is ~12%.

National Impact

- Summarizing the Carrier, nationwide line counts from the published SM results we find:

HCPM Summary Results from Results Posted in 2000							
Company	Total Lines	Business Lines	Residential Lines	ARMIS based Special Access channels	Ratio of Special Access Channels to Business Lines	Estimated Special Access lines using HCPM default 13%	Difference between Special Access Channels and Special Access Lines based upon a 13% Ratio
ALIANT COMMUNICATIONS	306,390	88,181	190,677	27,541	31%	11,464	16,077
AMERITECH	25,208,123	7,274,288	12,998,990	4,934,879	68%	945,657	3,989,222
ANCHORAGE TEL UTILITY	184,437	60,093	94,556	29,789	50%	7,812	21,977
BELL ATLANTIC	25,314,690	8,222,603	14,015,520	3,075,988	37%	1,068,938	2,007,050
BELL SOUTH	28,165,451	6,998,785	16,451,486	4,715,388	67%	909,842	3,805,546
CINCINNATI BELL	999,520	271,132	655,240	73,157	27%	35,247	37,910
FRONTIER CORPORATION	683,143	174,403	352,071	156,696	90%	22,672	134,024
GTE CORPORATION	19,652,444	5,077,299	12,307,921	2,266,590	45%	660,049	1,606,541
NORTH STATE TEL CO	146,511	40,326	86,192	19,988	50%	5,242	14,746
NYNEX	25,042,039	5,918,534	11,703,370	7,420,264	125%	769,409	6,650,855
PACIFIC BELL	23,563,277	6,979,504	11,013,873	5,569,627	80%	907,336	4,662,291
ROSEVILLE TEL CO	134,649	33,838	84,031	16,786	50%	4,399	12,387
SO NEW ENGLAND TEL	2,308,316	737,857	1,547,063	23,198	3%	95,921	(72,723)
SOUTHWESTERN BELL	20,107,656	6,815,162	8,947,030	4,345,650	64%	885,971	3,459,679
SPRINT	6,627,285	1,492,085	3,987,252	1,147,980	77%	193,971	954,009
ST. JOSEPH TELEPHONE	168,856	38,978	120,014	9,851	25%	5,067	4,784
US WEST	23,213,128	5,211,603	11,505,044	6,495,779	125%	677,508	5,818,271
TOTAL	***201,825,915***	***55,434,671***	***106,060,330***	***40,329,151***	***73%***	***7,206,507***	***33,122,644***

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- In order to minimize code changes, easiest model workaround is to replace ARMIS special access inputs with either
  - An estimate of the special access actual copper pair equivalents for each central office could be requested from each company, or
  - Use the SM's default 13% ratio of business lines.
- With either option, the user should also set the user input of "pct_lsa" to 0 so that the model results for universal service recognize that the special access lines are already on a pair equivalents basis.

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- This issue of over counting special access lines is not an issue just raised by BST. It has been recognized by state Commissions. In their January, 2001 report on Georgia Universal Service (Docket No. 5825-U), the Georgia Commission ordered (page 54):

> *"The Commission agrees with BellSouth that the use of ARMIS reported lines overstates the number of lines the SM actually uses to develop the network. The Commission approves using access line counts supplied by BellSouth."*

CERTIFICATE OF SERVICE

I, Kelseau Powe, Jr., do hereby certify that I have caused the foregoing **COMMENTS OF BELLSOUTH CORPORATION, QWEST COMMUNICATIONS INC. and SPRINT CORPORATION** to be 1) filed in hard copy, an original and four copies, with the FCC, 2) served, via hand delivery, on Sheryl Todd, and 3) served, via hand delivery with diskette, on the FCC's contractor International Transcription Services, Inc.

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