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August 1, 2002

FILED[3]
AUG 0 1 2002
Missouri Public
Service Commission

Secretary
Missouri Public Service Commission
P. O. Box 360
Jefferson City, Missouri 65102

Re: Case No. TR-2001-65

Dear Mr. Roberts:

Enclosed for filing, please find an original and eight copies of the Rebuttal Testimony of Robert C. Schoonmaker. Please note that Schedule RCS-10 is designated as "proprietary" because it contains confidential business information and Schedule RCS-11 is designated as "highly confidential" because it incorporates information received from Staff that was designated as highly confidential. Therefore, these schedules are being filed under seal.

Please see that this filing is brought to the attention of the appropriate Commission personnel. I thank you in advance for your attention to and cooperation in this matter.

Sincerely,

Brian T. McCartney

Brian T. McCartney

BTM/da
Enclosures
cc: Parties of Record

Exhibit No.:
Issue: Investigation of Exchange Access Costs
Witness: Robert C. Schoonmaker
Type of Exhibit: Rebuttal Testimony
Sponsoring Party: Small Telephone Company Group
Case No.: TR-2001-65
Date: August 1, 2002

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. TR 2001-65

REBUTTAL TESTIMONY OF
ROBERT C. SCHOONMAKER

ON BEHALF OF

SMALL TELEPHONE COMPANY GROUP

Exhibit No..:_____
Issue: Investigation of Exchange Access Costs
Witness: Robert C. Schoonmaker
Type of Exhibit: Rebuttal Testimony
Sponsoring Party: Small Telephone Company Group
Case No.: TR-2001-65
Date: August 1, 2002

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of an Investigation of the	)	
Actual Costs Incurred in Providing Exchange	)	Case No. TR-2001-65
Access Service and the Access Rates to be	)	
Charged by Competitive Local Telecommunications	)	
Companies in the State of Missouri	)	

AFFIDAVIT OF ROBERT C. SCHOONMAKER

Robert C. Schoonmaker, of lawful age, being duly sworn, deposes and states as follows:

1. My name is Robert C. Schoonmaker. I am employed by GVNW Consulting, Inc. as a Vice President.

2. Attached hereto and made a part hereof for all purposes is my rebuttal testimony with accompanying schedules.

3. I hereby affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief and that the information contained in the attached schedules is also true and correct to the best of my knowledge and belief.

Robert C. Schoonmaker

Subscribed and sworn to before me this 1st day of August, 2002.

_____ Notary Public

My Commission expires: 12-27-2003

OFFICIAL SEAL
PAMELA J. RITZWIG
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 12-27-2003

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REBUTTAL TESTIMONY OF ROBERT C. SCHOONMAKER

Q. Please state your name and address.

A. My name is Robert C. Schoonmaker. My business address is 2270 La Montana Way, Colorado Springs, Colorado 80918.

Q. By whom are you employed and in what capacity?

A. I am a Vice President of GVNW Consulting, Inc., a consulting firm specializing in working with small telephone companies.

Q. Are you the same Robert C. Schoonmaker that previously filed direct testimony in this proceeding?

A. I am.

Q. What is the purpose of your testimony?

A. My testimony will primarily respond to the direct testimony of Dr. Ben Johnson, witness for the Staff of the Missouri Public Service Commission. My testimony will respond to some of the cost concepts propounded by Dr. Johnson. In addition, I will provide responses to and analysis of the cost studies performed by Dr. Johnson, particularly as they relate to the small Missouri telephone companies.

COST CONCEPTS

Q. Dr. Johnson devotes an extensive portion of his testimony to addressing general cost concepts and definitions. Are there any of these concepts that you want to comment on?

A. Yes. There are several:

1. The use of "stand alone" cost in this proceeding.

2. The use of TSLRIC cost in this proceeding.

3. The use of other cost measures in this proceeding.

Q. What are your comments regarding the use and presentation of stand alone costs in this proceeding?

A. While I do not take issue with the general description of economic rationale related to the use of stand-alone cost in economic theory, I believe that it is important to recognize that those costs, if developed properly, will only be useful in defining a "ceiling" on access costs and will not necessarily provide much useful information in establishing an appropriate "level" of access cost and access rates. To the extent that those cost measures, or any cost measure, are not developed appropriately, they obviously provide little use to the Commission in its evaluation of access costs. The overall level of access costs developed in Dr. Johnson's stand alone studies provide a ceiling well in excess of current access rates.

Q. Do you have concerns about the stand alone costs developed by Dr. Johnson for some of the individual cost categories?

A. I certainly do. As I will develop later in this testimony, I do not believe that the stand alone costs developed by Dr. Johnson for local switching and local transport for the small companies are appropriate representations of those costs. Consequently, they do not constitute appropriate ceilings against which the local switching and local transport rates of the small companies should be judged.

Q. What are your comments regarding the use of TSLRIC costs in evaluating access costs?

A. I agree with Dr. Johnson's comments that such costs, when appropriately developed, constitute the absolute floor level of the cost of service. I agree with his statements that such costs are too low for use in pricing access and that they would not provide a firm with the revenues necessary to maintain the company as a going concern. Dr. Johnson emphasizes several times in his testimony these points, and I think it is important to reiterate them. It is important that the Commission recognize the theoretical concept behind TSLRIC costing in reviewing any such cost results and that it clearly recognizes that these costs are theoretical constructs that provide only a minimal floor for pricing and not an appropriate pricing level.

Q. Dr. Johnson proposes using, and has developed his various cost studies based on, the alleged forward-looking costs of the small Missouri companies and appears to

imply that such studies represent the "actual costs" of those companies. Do you agree with this characterization?

A. I do not. As Dr. Johnson quoted in his testimony, the Commission order establishing this docket specifically required that the costs developed be the "actual costs" of the individual companies. Dr. Johnson's schedules include specific "cost" results for each individual small company. However, from reviewing his cost study techniques, these results are clearly not the "actual costs" of the companies.

Q. Can you elaborate on that?

A. Yes. First, the hypothetical "forward-looking" costs of any company do not and cannot represent the "actual costs" that a company has and is incurring in the provision of service since such a concept ignores the fact that investments in the actual network cannot be made at a single point in time and that they actually reflect costs incurred over a span of many years.

Second, the forward-looking cost models used by Dr. Johnson to develop loop cost reflect the cost of a hypothetical network using network technology and assumptions that the small Missouri companies do not have in place. That hypothetical network has costs and capabilities that are different, in most cases considerably different, from the actual network the companies have in place. The assumptions used in developing the cost of that network are assumptions that were developed to represent broad cost levels on a national level and do not

necessarily reflect the actual costs incurred by the small Missouri companies in operating their individual companies.

Third, the forward-looking cost models used by Dr. Johnson to develop switching and transport costs give no consideration to the costs of the small Missouri companies. They are forward-looking cost models related to Verizon, Sprint, and Southwestern Bell Telephone Company (SWBT). From my review of Dr. Johnson's methods for these elements, it appears that no direct consideration was given to cost differences they may be incurred by small Missouri companies in comparison to the large companies to reflect such considerations as economies of scale and scope, company size, geographic diversity, manufacturer availability, and volume discount availability. The method used by Dr. Johnson for these items was a simple regression technique applied to large company results that does not consider these other factors. Thus, these costs, at best, reflect the hypothetical forward-looking cost of these large companies, but not the small Missouri companies.

Q. On Page 25 of his testimony Dr. Johnson states, "...the ability to develop cost estimates on a uniform, consistent, basis was imperative in this investigation." Do you agree with this statement?

A. No. While I understand the desirability of having a degree of consistency for the sake of ease of administration and comparability, I do not agree that consistency is imperative, nor do I believe that Dr. Johnson totally believes this. For example, on page 17 he states that he "...strongly disagrees with any attempt to identify and

focus exclusively on a single 'best' type of cost..." If one reviews a variety of costs, developed under different methods, there is likely to be a lower degree of consistency in arriving at results. Dr. Johnson, in other areas of his testimony, stresses the importance of consistency in inputs, yet he specifically proposes, appropriately, I believe, differences in the cost of capital for large and small companies. Though he says consistency is imperative, he uses direct modeling to develop switching and transport costs for the large companies, but uses a simple regression technique to do so for the small companies. He uses three different transport models to develop the costs for the individual large companies. All of these decisions reflect his perceived need to make adjustments from "consistency" to recognize specific circumstances. I firmly believe that this approach could apply in other circumstances as well. The use of the actual cost studies I presented in direct testimony for small Missouri companies, while using different studies for large companies comes specifically to mind. The large companies are subject to price cap regulation, while the vast majority of small Missouri companies are subject to rate base/rate-of-return regulation. The actual cost studies are consistent with rate-of-return regulation. The large companies generally support forward-looking costs and have their own cost models to develop such costs. The small companies neither support the use of such costs nor have appropriate cost models to develop them.

Q. Sprint witness, Randy G. Farrar, on page 7 of his Direct testimony states that "The FCC's Forward-Looking Economic Cost standard is the only appropriate

standard to determine the cost of switched access." Do you agree with this statement?

A. I do not. While this Commission may have used such studies in arbitration proceedings related to the pricing of unbundled network elements (UNE's) and may have used such studies to apply to rate rebalancing proposals by price-cap regulated companies such as Sprint, the Commission has also used other techniques for other companies, such as the small Missouri companies that are rate base/rate-of-return regulated. It is neither inappropriate nor illegal for the Commission to use other cost techniques, such as the actual cost studies I presented in my direct testimony, for determining the rates for such companies. I believe that those studies are the only studies presented to the Commission at this point in time that present the "actual cost" of the companies.

COST MODELS

Q. Dr. Johnson has based his analysis of loop costs on the use of the FCC Synthesis Model. Do you believe that this model produces reasonable results of the forward-looking loop costs of the small Missouri companies?

A. I do not.

Q. What is the basis of your statement?

A. I was appointed by the Federal Communications Commission (FCC) to serve on the Rural Task Force (RTF) that was tasked to make recommendations to the

Universal Service Joint Board regarding the use of the FCC Synthesis Model for the determination of federal USF for rural companies. In that capacity I led the effort conducted by the Rural Task Force to analyze the FCC Synthesis Model and the results that it produced for rural telephone companies and conducted much of the analysis myself. The results of that analysis were presented to the RTF on May 25, 2000 and were later incorporated in the RTF's White Paper #4 titled, "A Review of the FCC's Non-Rural Universal Service Fund Method and the Synthesis Model for Rural Telephone Companies." I have attached that White Paper as Schedule RCS-9 to this testimony. The White Paper, including the Appendices, details the criteria used to analyze the model and the specific results of that analysis. The major criticisms of the Synthesis model are summarized on pages 9 and 10 of the report.

Q. Were Missouri companies among those included in the analysis done by the RTF?

A. Yes. The small Missouri companies were among those used in much of the analysis performed by the RTF.

Q. What conclusion did the RTF reach regarding the use of the Synthesis Model to develop the forward-looking costs of Rural Carriers?

A. The RTF conclusion was as follows:

> The aggregate results of this study suggest that, when viewed on an individual rural wire center or individual Rural Carrier basis, the costs generated by the Synthesis Model are likely to vary widely from reasonable estimates of forward-looking costs. In fact, much of the data analysis suggests that the model results tend to be in the high and low extremes, rather than near the expected results for the area being analyzed. While it may be technically

possible to construct a model with added precision and variables to account for the differences among Rural Carriers and between non-Rural Carriers and Rural Carriers, it is the opinion of the Task Force that the current model is not an appropriate tool for determining the forward-looking cost of Rural Carriers.[1]

Q. What conclusions did the FCC reach regarding the use of the Synthesis Model for Rural Carriers for determining federal USF?

A. The FCC concurred in and adopted the RTF recommendation that federal USF should be based on a modified embedded cost approach rather than the use of the Synthesis Model for five years. While the FCC indicated that it would continue to examine the potential for using forward-looking costs for Rural Carriers in the future and to develop inputs to the model more relevant to those carriers, it also recognized that, "...it is not possible to determine forward-looking costs for rural carriers at this time...."[2]

Q. Have there been changes in the Synthesis Model since that time that would change the conclusions of the RTF and the FCC?

A. While there have been some modifications made to the model logic since that time that are reflected in the version of the model used by Dr. Johnson, these changes did not address the criticisms raised by the RTF and the FCC. The conclusions of these two bodies were that the Synthesis Model proposed for use

[1] RTF's White Paper #4 titled, "A Review of the FCC's Non-Rural Universal Service Fund Method and the Synthesis Model for Rural Telephone Companies.", p. 10.
[2] Fourteenth Report and Order, Twenty-Second Order on Reconsideration, and Further Notice of Proposed Rulemaking in CC Docket No. 96-45, and Report and Order in CC Docket No. 00-256, Adopted May 10, 2001, Released May 23, 2001, para. 177.

by Dr. Johnson do not reflect the forward-looking costs of Rural Carriers including those carriers in Missouri.

Q. Do the conclusions of the RTF highlight one of your significant concerns with the use of forward-looking costs in this and other regulatory proceedings, particularly as the relate to the small Missouri companies?

A. They do. The economic theory behind the use of forward-looking costs assumes that such costs can be identified and that they are the appropriate costs to use by firms in economic decision making. One of my primary concerns about this theory is the difficulty in identifying such costs, even when the parties agree that it is appropriate to do so. The cost study techniques, models, and assumptions necessary to run the models are susceptible to widely differing judgments and estimates and the forward-looking cost results vary so widely that the validity of the method is questionable.

Q. Was there direct testimony filed that supports this concern?

A. Yes. Both Dr. Johnson and Sprint witness Farrar support the use of forward-looking costs, and both appear to have used the same models. It appears from Mr. Farrar's testimony that only the model inputs differ between the two results, though some of those input differences may reflect different views of forward-looking costs. Mr. Farrar's results, as shown on Page 29 of his HC testimony, show Sprint developed costs that range from 2.7 to 57.6 times higher than those developed by Dr. Johnson.

Q. Can you provide an example of the differences that input assumptions can make from the cost studies submitted by Dr. Johnson?

A. Yes. Dr. Johnson strongly emphasizes the need for consistent assumptions and assumptions that are supported by "neutral" parties such as Commissions rather than proponents of a particular position. While in regard to the FCC Synthesis Model, Dr. Johnson primarily uses the FCC default assumptions, he does recommend different inputs, in some cases, from those proposed by the FCC. Some of these changes are in areas where the FCC spent a good deal of time reviewing the data and proposed alternatives and made decisions to use certain data which Dr. Johnson now questions and modifies. Schedule RCS-11(HC) shows the impact of Dr. Johnson's input changes on the loop costs of the small Missouri companies. On this schedule I have compared the loop costs of each of the companies that Dr. Johnson developed with the loop costs based on the FCC's default inputs. The loop cost differences (in all cases Dr. Johnson's costs are lower) range from a low of 5.4% to a high of 19.5% with the total company numeric average of 15.0%. This illustrates that even with two presumably "neutral" parties applying their judgment to the appropriate inputs for the same model, the resulting "forward-looking costs" are significantly different.

STAFF COST STUDIES

Q. Let's turn now to the specifics of the cost studies prepared by Dr. Johnson for the small Missouri companies. Have you reviewed the studies that Dr. Johnson performed in arriving at the switching investments and costs he used in calculating the end office switching costs for these companies?

A. I have reviewed them to a fair degree of detail.

Q. Do you believe that those studies represent a reasonable estimation of the forward-looking costs of the small Missouri companies?

A. I do not.

Q. Can you briefly summarize your reasons for making that statement?

A. Yes. There are several.

1. The regression analysis performed by Dr. Johnson is based solely on results of forward-looking cost models for Verizon and Sprint offices, not on the cost of small companies.

2. The sample of offices included in the regression analysis is not likely to be representative of small Missouri company switches.

3. The regression analysis does not generate statistical results that appear to be valid.

4. A comparison between the central office switching investments generated by Dr. Johnson's models and the actual investments made by the companies show

that his investment amounts substantially understate the companies' actual investments.

5. Factors used by Dr. Johnson in arriving at the rates he derives are not based on actual company data.

Q. What factors could cause cost differences between the switches of the small companies and the switches of Verizon and Sprint?

A. There are a number of factors that could cause the costs of the small companies to differ from those of Verizon and Sprint. One prime factor would be the manufacturer discounts from list prices that those very large companies could achieve in comparison to the smaller companies. Dr. Johnson's analysis is based on the large companies' manufacturer discounts and does not take into consideration lower discounts that small companies are likely to experience. A second factor is that the larger companies have larger offices and thus are likely to purchase larger capacity switches with different cost characteristics. The cost characteristics of a larger capacity DMS-100 Nortel switch can be anticipated to be different than the cost characteristics of the DMS-10 switches which the small companies would typically have. A third factor is that the mix of manufacturers represented in the Verizon/Sprint sample may be significantly different than the small company mix. Fifty-seven of the 63 switch complexes included in Dr. Johnson's analysis were Verizon switches with only six Sprint switches. Verizon historically has had significant switching investment in GTD-5 switching systems, a fact that could make the sample non-representative. Finally, Dr. Johnson's

analysis is based not on the cost of individual switching units, but on the cost characteristics of host/remote switching complexes. It is likely that both the mix of the number of remote switching units to host switches and the mix of lines to individual switching units is different for the small companies than it is for Verizon and Sprint. These factors are likely to impact the actual costs of the small Missouri companies.

Q. Are there other reasons than those you just expressed why the sample chosen by Dr. Johnson may not be representative of the small company switches?

A. Yes. Of the 63 switching complexes used in Dr. Johnson's regression analysis, four of the complexes have greater than 20,000 lines and twelve have greater than 10,000 lines. Only one of the small company host/remote complexes has greater than 10,000 lines. We were concerned as to what impact the inclusion of these larger switches had on the overall regression results. Consequently, I had a member of my staff duplicate Dr. Johnson's regression and then perform the regression excluding the switches over 20,000 lines and then excluding the switches over 10,000 lines. We then calculated the investments generated by the regressions for these two additional scenarios and compared them with Dr. Johnson's results for five different companies. The results of this analysis are shown in the table below:

	Access Lines	Dr. Johnson	Excl. 4 Switches Over 20,000 lines	Excl. 12 Switches Over 10,000 lines
Farber Telephone Company	258	$ 107,025	$ (241,283)	$ (273,988)
New Florence Telephone Company	488	$ 129,942	$ (153,659)	$ (178,132)
Citizens Telephone Company	4,437	$ 651,748	$ 651,820	$ 680,699
Kingdom Telephone Company	5,461	$ 1,277,160	$ (420,515)	$ (530,220)
Grand River Mutual Telephone Corp.	14,666	$ 3,072,634	$ 2,708,271	$ 2,823,305

This analysis demonstrates that if the larger switches are excluded then the regression results are significantly different for three of the five companies tested with the projected switch investments showing negative rather than positive values. In my mind, this raises significant questions regarding the validity of the regression analysis. Though I didn't have time to analyze the impacts of the sample on the regression further, I did note that Dr. Johnson did not include all the Verizon and Sprint switch complexes in his sample. He does not provide a description of how or why the switches in the sample were selected.

Q. Did you make any comparisons of Dr. Johnson's regression results for the small Missouri companies with the companies' actual switching investments to test the validity of his results?

A. I did. While I recognize that there may be a question in the mind of some of the validity of comparing actual investments to estimated forward-looking investments, I believe that such a comparison is appropriate for COE switching investment. The current forward-looking technology for central office switching is very similar to the technology that most companies have deployed in their switches, and most have software upgrades which comport to current regulatory

requirements. Thus, the current and forward-looking technologies are relatively consistent. While there has been some decrease in the cost of COE switching hardware over time, for small companies it is my impression that this has largely been offset by increases in software and right-to-use costs. Attached as Schedule RCS-10 is a comparison of the 1998 COE switching investment of most of the Small Missouri telephone companies with the investment in COE switching generated by Dr. Johnson regression analysis. The analysis shows that for all but one company, the regression analysis generates considerably less investment than the actual investments of the companies. For the companies as a whole, Dr. Johnson's cost study results show investments only 42% of the companies' actual costs.

Unfortunately, at the time I prepared this schedule I did not have 2001 data to make the comparison. From my understanding of activities that have taken place since 1998, the latest data that I had available, I expect that the difference would be even greater based on 2001 investments.

Q. You mentioned that some of the factors used in Dr. Johnson's switching studies were not based on individual company data. Could you provide some examples of this?

A. Yes. There are several. First, in calculating the per minute cost for line termination and for getting started costs, Dr. Johnson has used a factor of 254 minutes per line for all the companies. I cannot determine from his studies how

this number was calculated, but the same factor is used for all companies. In calculating the pro rata weighting column for switching costs, Dr. Johnson uses a fixed allocator for all the small companies rather than individually calculated pro rata percentages. The derivation of this allocator is also not shown in the final cost studies. Finally, in calculating the cost of tandem switching a factor of 10,044 minutes per trunk per month is used. This factor is also used in calculating transport rates, and I will discuss it further in relationship to the transport cost studies.

Q. On page 127 of his testimony, Dr. Johnson discusses comparisons between current intrastate end office switching rates and the cost he has developed for local switching. Could you comment on his conclusions?

A. Yes. Dr. Johnson indicates that based on the costs that he has developed that the local switching rates for the Missouri companies exceed his estimates of stand-alone costs and suggests that substantial rate reductions might be in order. I think it is important for the Commission to recognize that the costs that he is using to make this comparison are seriously flawed as I have discussed in my testimony. Further, the Commission should recognize that in the past, local switching rates have been designed to recover both the traffic sensitive switching costs and the non-traffic sensitive switching costs that Dr. Johnson identifies as "port" costs. Thus, the comparisons that he is making are to an extent an "apples to oranges" comparison since the current rates were intended to recover costs that Dr. Johnson is not including in his cost comparison.

Q. Let's turn now to the transport studies conducted by Dr. Johnson for the small companies. Do you have some of the same concerns regarding these studies that you did regarding the switching studies?

A. Yes, I do have some of the same concerns. Dr. Johnson's analysis of transport costs for small companies rests on a regression analysis of costs per circuit for Verizon, Sprint, SWBT, and Century/Spectra. The regression is based on costs per circuit for each of the wire centers of these companies, both large and small. The sample, for example, includes circuit costs in St. Louis, Kansas City, Springfield, and Columbia where traffic volumes, circuit densities, and trunk efficiencies are very high. There are a significant number of wire centers in these areas where circuit costs are low in relationship to distance and the number of lines served that undoubtedly reduce the costs reflected in the regression analysis. Though the small companies do not operate in these areas, the analysis done by Dr. Johnson includes the cost of serving high density urban areas in the overall cost development for these companies. I am quite certain that Dr. Johnson's approach tends to understate, probably significantly, the cost of transport for the small companies.

Q. Can you explain some of the cost characteristics of interoffice networks that impact the circuit and per minute costs as customer density decreases?

A. Yes. In today's fiber optic networks, the number of circuits that can transmitted over the same set of fibers can vary widely depending on the electronic and laser

equipment used to transmit light over the fiber network. As the number of circuits that can be handled increases, the electronic equipment becomes somewhat more costly but dramatically more efficient in the number of circuits that can be handled over the same number of fibers. This causes a substantial reduction in the cost per circuit. Thus, as the traffic density grows the cost per circuit of handling the traffic decreases considerably. Costs per circuit in urban areas where interoffice traffic volumes are high are considerably less than in rural areas where traffic volumes are lower and a smaller number of circuits is transmitted over each pair of fibers.

A second factor that influences the cost of transport services in urban areas versus rural areas is the size of the trunk groups and the economies of scope that can be obtained in terms of the average usage of each trunk. Trunking networks are engineered to meet peak demand periods so that customers do not experience call blocking even during the highest usage periods. As the overall quantity of traffic increases, the required number of trunks grow at a slower rate than the traffic quantities because the overall efficiency of the trunk groups increase. This means that during a month a higher number of minutes per trunk can be handled through larger trunk groups than smaller ones. With a higher number of minutes per trunk or circuit, the overall cost per minute of transport will be lower in an urban area than in a rural area with smaller amounts of traffic and smaller trunk groups.

A third factor that impacts the cost of trunking in rural areas is the fact that circuits using digital transmission technology are provisioned in minimum quantities of 24 trunks at a time, a T1 or DS1 digital service. If the engineering requirement calls for 26 or 28 circuits, 48 will still need to be provisioned causing additional losses of economies of scope. The percentage impact of this investment "lumpiness" tends to be larger in small offices with relatively small trunk groups.

Q. Are these factors recognized in Dr. Johnson's cost studies for the small Missouri companies?

A. Only partially. Dr. Johnson's studies, I believe, partially recognize the first factor in that the cost calculations for individual wire centers of the large companies will show varying costs per circuit depending on the traffic density encountered in that wire center. However, the regression technique used by Dr. Johnson on all wire centers of the large companies, both urban and rural, to arrive at a cost per circuit for the small companies does not recognize that the mix of rural, high-cost, versus urban, low-cost, circuits is quite different for the rural companies than it is for the large companies.

The second and third factors, which impact the average number of minutes per circuit that are actually used, are not reflected in Dr. Johnson's cost studies. He converts the cost per circuit to costs per minute by dividing by a fixed factor of

10,044 minutes per circuit. This factor is the same as the factor used in the FCC Synthesis Model but represents a theoretical high efficiency usage of trunks.

Q. Is this factor representative of actual trunk usage in rural areas?

A. I do not believe that it is. It may not even be representative of actual trunk usage in urban areas. At the time the FCC implemented its local transport rate restructure several years ago this issue was raised in relationship to the trunk usage that should be used to convert the cost of a dedicated circuit to a per minute rate. In that proceeding the FCC established a 9,000 minute per circuit level as presumptively reasonable for trunks around the country, which on a national basis are heavily concentrated in and between urban areas. In exploring the impact of this factor over the years, I have occasionally conducted, or seen the result of, studies of actual trunk usage for rural companies. In most cases these tend to show actual usage of 4,000 to 6,000 minutes per circuit. Dr. Johnson's studies do not take this lower usage per trunk into account and thus, I believe, substantially understates the transport costs of the small companies.

Q. Does Dr. Johnson's comparisons of the current local transport rates to the costs he develops cause you similar concerns to those expressed in regard to the comparison to local switching rates?

A. I have similar concerns regarding Dr. Johnson's conclusions regarding the appropriateness of existing local transport rates based on comparisons to the costs

he develops, which I believe substantially understate the actual transport costs of the small companies.

Q. In evaluating the costs developed for the small companies by Dr. Johnson, does the Commission need to take into consideration issues raised by SWBT, Verizon, and Sprint related to the costs of their respective companies?

A. It certainly does. Sprint witness Farrar details in his direct testimony a number of concerns regarding the cost study inputs used by Dr. Johnson and, as described briefly earlier in my testimony, arrives at costs for Sprint's services that are several times higher than the TSLRIC costs developed by Dr. Johnson. I expect that the rebuttal testimony of SWBT will also raise similar concerns. If the Commission determines that Dr. Johnson's inputs, assumptions, and modeling are not appropriate for Sprint or SWBT and should be changed, similar cost changes would need to be reflected in revised inputs to the regression analysis used to develop small Missouri company costs in conjunction with Dr. Johnson's techniques.

Q. Would such adjustments be necessary if the Commission determines that the cost studies you presented in direct testimony were more representative of the actual costs of the small companies than are Dr. Johnson's study techniques?

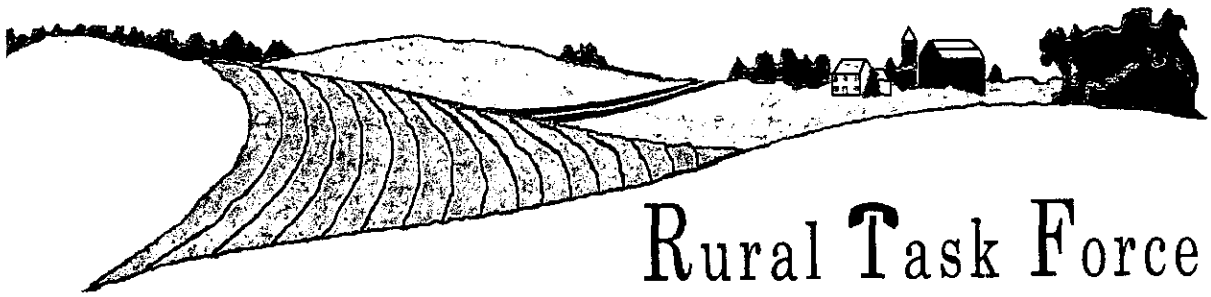
A. No, they would not. I continue to recommend that the Commission use the cost studies I presented in my direct testimony as the basis for determining the small Missouri companies' costs of providing switched access service.

Q. On pages 44 through 49 of his testimony. Dr. Johnson discusses his development of factors for including common costs in his cost studies. Could you comment on his analysis and conclusions in relation to the small Missouri telephone companies?

A. Yes. Dr. Johnson recognizes that his method for arriving at estimated common costs is less precise than other estimates in his cost studies and thus might be subject to additional scrutiny. In addition to that admission, I believe that the Commission should be aware that the numeric analysis that led to his conclusions focused solely on Sprint, Verizon, and SWBT and did not involve any analysis of the common costs of the small Missouri companies. In reviewing these types of costs for small companies in other proceedings, it has been my experience that the common costs of small companies differ significantly in relationship to other costs from the relationships experienced by larger companies. This is another area of Dr. Johnson's study where the actual costs of the small companies have not been appropriately reflected, but have been assumed to be similar to larger companies. Since Dr. Johnson's method for estimating common costs relies on a percentage relationship to other costs, his common cost estimate would be underestimated to the extent that he has underestimated the switching and transport costs of the small companies.

Q. Does this conclude your rebuttal testimony?

A. Yes, it does.



Rural Task Force

A Review of the FCC's Non-Rural Universal Service Fund Method and the Synthesis Model for Rural Telephone Companies

Rural Task Force
White Paper 4
September, 2000

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The Rural Task Force is an independent advisory panel appointed by the Federal – State Joint Board on Universal Service to provide guidance on universal service issues affecting rural telephone companies. Opinions expressed in this White Paper are the collective view of the Rural Task Force membership and are not intended to represent the views of organizations to which each member is affiliated or those of the FCC or the Joint Board on Universal Service.

Schedule RCS-9

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EXECUTIVE SUMMARY

This White Paper, the fourth in a series, documents a comprehensive analysis undertaken by the Rural Task Force (Task Force) of the suitability of the explicit high-cost support mechanism developed by the FCC for non-Rural Carriers for the determination of high cost funding for individual Rural Carriers[1]. This analysis consisted of two phases:

1. A study of the impact of applying the non-rural explicit support funding rules, including the use of the Synthesis Model, to Rural Carriers, and

2. An analysis of the viability of the Synthesis Model as a tool for the estimation of forward-looking cost for Rural Carriers for purposes of determining explicit high-cost support.

A. APPLICATION OF THE NON-RURAL METHODOLOGY

In November, 1999, the Federal Communications Commission (FCC) developed rules for the determination of explicit high-cost support for non-Rural Carriers. This process begins with the determination of a statewide average forward-looking cost for all non-Rural Carriers within a state. That statewide average is then compared to the nationwide average forward-looking cost for all non-Rural Carriers. If the statewide average cost is less than 135 percent of the nationwide average cost, then no explicit

[1] "Rural telephone company" means a local exchange carrier operating entity to the extent that such entity--(A) provides common carrier service to any local exchange carrier study area that does not include either--(i) any incorporated place of 10,000 inhabitants or more, or any part thereof, based on the most recently available population statistics of the Bureau of the Census; or (ii) any territory, incorporated or unincorporated, included in an urbanized area, as defined by the Bureau of the Census as of August 10, 1993; (B) provides telephone exchange service, including exchange access, to fewer than 50,000 access lines; (C) provides telephone exchange service to any local exchange carrier study area with fewer than 100,000 access lines; or (D) has less than 15 percent of its access lines in communities of more than 50,000 on the date of enactment of the Telecommunications Act of 1996 (47 U.S.C. Section 153 (37)). The terms Rural Carrier or RTC are meant to incorporate the statutory definition of "rural telephone company" and its application in the FCC rules, adopted pursuant to CC Docket No. 96-45, which set a separate schedule and additional scrutiny for "rural telephone companies," May 8, 1997 Decision, ¶ 96. FCC *Public Notice* CC Docket No. 96-45, DA 98-1205 (released June 22, 1998) lists recognized self-certified "Rural Telephone Companies."

federal high-cost support would be provided to any non-Rural Carrier in that state. In states where the average forward-looking cost exceeds this benchmark, funding would be provided to the non-rural wire centers whose cost exceed the benchmark.

When this process was run by the FCC for the non-Rural Carriers it produced the following results:

Current Support	$207 million
FCC Model Support	$252 million[2]

To test the suitability of the non-Rural method to the Rural Carriers, a comprehensive analysis was undertaken. FCC model runs for Rural Carriers as well as non-Rural Carriers were obtained and analyzed.[3] Due to anomalies detailed in the report, it was not possible to exactly match the FCC output data. Despite these minor discrepancies, however, it was possible to obtain a reasonable approximation of the impact of applying the non-rural mechanism to Rural Carriers.

In White Paper 2 the Task Force detailed the numerous and significant differences between Rural Carriers and non-Rural Carriers. These differences are apparent when the nationwide average forward-looking costs for non-Rural Carriers are compared to the costs for Rural Carriers:

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[2] This is the amount of non-rural support produced by the FCC's decision of October 21, 1999. See, Federal-State Joint Board on Universal Service, CC Docket No. 96-45, *Ninth Report and Order and Eighteenth Order on Reconsideration*, FCC 99-306 (Oct. 21, 1999). These support calculations were revised on January 20, 2000, and April 7, 2000. See, Common Carrier Bureau Announces Procedures for Releasing High-Cost Support Amounts for Non-Rural Carriers and Revised Model Results, Public Notice, CC Docket No. 96-45, 97-160, DA 00-110 (Jan. 20, 2000) and Federal-State Joint Board on Universal Service, CC Docket No. 96-45, *Twentieth Order on Reconsideration*, FCC 00-126 (April 7, 2000). Under these revised figures total annual funding for non-Rural Carriers is estimated to be $220 million.

[3] Synthesis Model runs for Rural Carriers were obtained from AT&T. Due to data limitations it was not possible to run the model for some Rural Carriers, particularly those in Alaska and the insular areas.

Nationwide Average Cost per month

Non-Rural Carriers	$23.52[4]
Rural Carriers	$59.36
Combined	$26.09

Also note that when the Rural Carriers are included in the nationwide average, the average only goes up $2.57 per month, while the difference between the Rural Carriers as a group and the non-Rural Carriers is $35.84. As documented in White Paper 2, this is due to the fact that the Rural Carriers make up only eight percent of the total nationwide access lines.

More significant, however, is the impact of including the Rural Carriers in the support calculation for the determination of explicit support. Applying the non-Rural method for support calculations to both non-Rural and Rural Carriers produces the following results:

	Non-Rural	**Rural**
Current Support	$207 M	$1,553 M
FCC Method Support	$241 M[5]	$451M
Difference	+ $34 M	**- $1,102 M**

The dramatic decrease in explicit support to Rural Carriers by applying the non-Rural method raised considerable concern among a number of Task Force members that the support provided under these rules would not be "sufficient," and therefore might violate

[4] This is the nationwide average cost for non-Rural Carriers produced by the RTF's analysis of the Synthesis Model and the non-Rural Carrier method. Based on subsequent changes in the FCC outputs, the current nationwide average produced by the Synthesis Model is $23.35 per line per month.

[5] This level of support for non-Rural Carriers differs from the amount shown on the previous page. The difference results from applying the non-rural support method to all carriers, rural and non-rural, rather than non-Rural Carriers only.

Section 254 of the Telecommunications Act of 1996.[6] It would appear that a primary driver of this decreased level of support is the averaging of costs at the statewide level. This exercise clearly demonstrates that the overall framework of the rules for calculating the support, as much as the model tool itself, must be fully considered in developing an explicit support mechanism for Rural Carriers which is consistent with the 1996 Act.

Two additional differences between Rural Carriers and non-Rural Carriers contribute to the Task Force's conclusion that the non-Rural method is not sufficiently accurate to form the basis for determining each Rural Carrier's explicit support:

- Most non-Rural Carriers, particularly the Regional Bell Operating Companies (RBOCs), serve hundreds or thousands of wire centers while most Rural Carriers serve relatively few wire centers, and
- Current explicit support is a tiny fraction of the non-Rural Carriers' revenue requirements, while for many, or most, Rural Carriers it constitutes a critical share of their revenue requirements.

These differences lead to a concern that even if the model produced approximately the same amount of aggregate support for Rural Carriers as the current system of support, there would still be "winners and losers" within the class of Rural Carriers. While there were changes in support for individual non-Rural Carriers which resulted from the use of the model, these changes were not as dramatic as they would be for Rural Carriers. The "Law of Large Numbers" suggests that for the RBOCs, those wire centers where the support results are too high will tend to offset those which are too low, resulting in a reasonable overall result. This is not the case for many Rural Carriers who serve only a few wire centers, or in some cases, a single wire center.

[6] Pub. L. No. 104-104, 110 Stat. 56 (1996 Act). The 1996 Act amended the Communications Act of 1934, 47 U.S.C. Section 151 et seq. (1996 Act). Hereinafter, all citations to the 1996 Act will be to the relevant section of the United States Code unless otherwise noted.

The financial impact of any error in support calculation is also minimal for the RBOCs. These companies today receive approximately $400 million in explicit universal service support, but have overall loop revenue requirements of approximately 40 billion dollars.[7] Thus, high-cost funding for non-Rural Carriers represents approximately one percent of loop revenue requirements. In contrast, within the group of 1,300 Rural Carriers federal universal service support payments for high cost loop support range from zero percent to as high as 74 percent of loop revenue requirements. Thus, the result of errors or radical changes in the amount of explicit support developed from a model which is imprecise at the company level could cause an individual Rural Carrier to either gain a substantial windfall or have a serious deficiency in "sufficient" support. In White Paper 1, *Rural Task Force Mission and Purpose*, we stated the following:

> "A universal service plan that works well in a competitive and deregulatory environment must avoid shortfalls, windfalls, and unnecessary regulatory costs."[8]

B. ANALYSIS OF THE SYNTHESIS MODEL FOR RURAL CARRIERS

A primary mission of the Task Force is to evaluate the proxy cost model developed for non-Rural Carriers to determine its applicability for use in the calculation of explicit support for Rural Carriers. The Task Force gave careful consideration to the model adopted by the FCC for non-Rural Carriers, and examined both the potential value and risks associated with applying the same model for determining forward-looking support for Rural Carriers and competitors serving customers in those areas. In November of 1999, the Task Force developed criteria for the evaluation of the proxy

[7] Data on overall loop revenue requirements was obtained from the Universal Service Data Collection material submitted by the National Exchange Carrier Association (NECA) to the FCC on October 1, 1999. See letter of October 1, 1999 from John G. Ricker of NECA to Magalie Roman Salas.
[8] White Paper 1, page 7.

model tool for use with Rural Carriers. Essentially, these criteria required any model to demonstrate the following:

- It should satisfy the 10 criteria established for the evaluation of proxy models by the FCC in their 1997 Universal Service Order.
- The network "built" by the model must reasonably represent the network built by a real-world Rural Carrier.
- Both the inputs to the model, and the results produced, must reasonably reflect the cost differences among Rural Carriers and between Rural Carriers and non-Rural Carriers.
- The model outputs must bear a reasonable relationship to actual company data, where appropriate.

To accomplish this analysis of the Synthesis Model, the Task Force conducted a detailed study of 23 sample companies. In addition, the Task Force compared model results with actual company data for 195 additional companies. Attempts were made to study a diverse group of companies in terms of size, geography and regions of the nation. Application of the FCC Synthesis model to the rural test companies produced the following results:

- The model lines differ significantly from actual lines served. While the model generally tends to underestimate lines, in about one-third of the wire centers it overestimated lines.
- Comparisons of the number of route-miles of plant summarized in the model with actual data produced significant variations. Again, differences occur on both the high and low ends with a general tendency for the model results to overestimate the actual data. In 12 percent of the wire centers studied the model data overestimated route miles by more than 200 percent.
- Model results for the type of plant vary widely from actual plant constructed. The model generally tends to overestimate the percentage of aerial and underground plant, and underestimate the percentage of buried plant. This is likely due to the diverse character of the rural geography, and the use of a single set of inputs by density zone based on the experience of non-Rural Carriers.
- In calculating the applicable density zones, the model significantly underestimates wire center area. In 95 percent of wire centers the land area is understated, and in over one third of these the understatement exceeds 90 percent.

- It significantly underestimates COE Switching investment. This is likely due to the lack of economies of scale of the Rural Carriers, and the general tendency of the model to underestimate lines served.
- Model results for various elements of general support investment vary widely from actual data and from rational forward-looking assumptions, with almost as many cases of overestimation as underestimation.
- Network Operations and Corporate Operations expenses are significantly underestimated, again likely due to the lack of economies of scale of Rural Carriers.

The aggregate results of this study suggest that, when viewed on an individual rural wire center or individual Rural Carrier basis, the costs generated by the Synthesis Model are likely to vary widely from reasonable estimates of forward-looking costs. In fact, much of the data analysis suggests that the model results tend to be in the high and low extremes, rather than near the expected results for the area being analyzed. While it may be technically possible to construct a model with added precision and variables to account for the differences among Rural Carriers and between non-Rural Carriers and Rural Carriers, it is the opinion of the Task Force that the current model is not an appropriate tool for determining the forward-looking cost of Rural Carriers. In making this recommendation, the Task Force recognizes that policy makers, after the development of and rigorous analysis of the Synthesis Model, have determined that it should be applied in developing universal service support for non-Rural Carriers. While the Task Force arrives at a different conclusion in regard to use of the model for Rural Carriers, we do not intend to imply in any way that revisions are needed to support mechanisms for non-Rural Carriers. Our analysis and recommendations are focused solely on the needs of Rural Carriers.

For the reasons detailed herein, we conclude that the methods used to determine support and the Synthesis Model developed for the non-Rural Carriers will not produce

an appropriate universal service mechanism for Rural Carriers. In White Paper 3 the Task Force explored alternative mechanisms for sizing a universal service support mechanism which would provide "specific, predictable and sufficient" universal service support for Rural Carriers, as required by the 1996 Act. In the remainder of this white paper, an in-depth analysis will be presented of the Task Force's exploration and testing of the FCC's Synthesis Model and non-rural support mechanism as applied to Rural Carriers.

I. INTRODUCTION

The first White Paper released by the Rural Task Force in September 1999 provided the policy and legal framework to serve as the foundation for the Task Force's efforts. White Paper 1 carefully delineated the rationale for why universal service support mechanisms for Rural Carriers and non-Rural Carriers may be appropriately different.

White Paper 2, released in January, 2000, placed into the record a first-of-its-kind overview of the broad operational and market differences that distinguish Rural Carriers from their urban counterparts, as well as documented the vast differences among the subset of Rural Carriers. Excerpts from the executive summary of White Paper 2 are shown as Appendix A and are integral to the analysis reflected in this white paper.

White Paper 3, released in August, 2000, examines alternative methods for developing Universal Service support for Rural Carriers that were considered by the Task Force.

The focus of this white paper, the fourth of a series, is to examine whether the FCC's Synthesis Model and/or the accompanying non-Rural Carrier method should be used as part of a universal service support mechanism for Rural Carriers. The white paper presents a comprehensive analysis of the Synthesis Model[9] and the FCC's non-rural support mechanism as applied to Rural Carriers. The white paper concludes that the

[9] This model is also referred to as the Hybrid Cost Proxy Model (HCPM) or the SYN model.

non-Rural Carrier support mechanism combined with the Synthesis Model is not appropriate for use in designing a universal service support system for Rural Carriers.[10]

II. ANALYSIS OF THE APPLICATION OF THE NON-RURAL HIGH-COST SUPPORT RULES, INCLUDING THE SYNTHESIS MODEL, TO THE RURAL CARRIERS

In November of 1999, the FCC issued an Order in CC Docket 96-45 specifying rules for the determination of explicit high-cost support for non-Rural Carriers.[11] The Order specified a five-step process for determining the new explicit high-cost support that a non-Rural Carrier would receive. The steps in determining this support are:

STEP 1	The Synthesis model is run to determine the forward-looking cost of universal service for each non-rural wire center in the nation.
STEP 2	The nationwide average cost of universal service in all non-rural wire centers is developed.
STEP 3	For each state, a statewide average cost of universal service in non-rural wire centers is developed.
STEP 4	The statewide average cost is compared to the nationwide average cost. For states where the statewide average cost is less than 135 percent of nationwide average cost, no explicit federal high-cost support will be provided to non-Rural Carriers in that state. In states where statewide average cost exceeds 135 percent, explicit federal support will be provided for 76 percent of the amount that cost exceeds the benchmark.
STEP 5	In states where explicit federal support is provided, the support is assigned to wire centers based on the relative support calculated at a wire center level to the statewide support that is available.

When the FCC initially analyzed this process for the non-Rural Carriers, it produced the following results:

[10] This model was approved by the FCC in its Order in CC Dockets No. 96-45 and 97-160, adopted on October 21, 1999 and released November 2, 1999.
[11] Ninth Report and Order and Eighteenth Order on Reconsideration in CC Docket No. 96-45 released November 2, 1999.

Prior Support	$207 million
FCC Model Support	$252 million

Under the pre-existing rules carriers receive explicit federal support when the embedded cost of their loop plant exceeds 115 percent of the nationwide average embedded cost. Under these rules non-Rural Carriers in 20 states currently receive federal universal service support. With the new rules only 8 states will receive explicit non-rural high-cost support based upon the forward-looking cost model and the statewide average cost standard. Non-Rural Carriers that currently receive federal universal service support, but will not receive any funding under the new rules (or who would receive less new funding than they currently receive), will be "held-harmless" for some interim transition period.

To test the applicability of the non-Rural method to the Rural Carriers, a comprehensive analysis was undertaken. The results of this analysis were presented to the Task Force at a meeting on January 13, 2000 in Washington, DC. A copy of the presentation made to the Task Force may be found in Appendix C.[12] Additional schedules showing state specific details of this analysis are included in Appendix D. For purposes of this analysis, the FCC model was run for both the non-Rural Carriers and Rural Carriers. The results of these combined model runs were then processed through the five-step support determination algorithm described above.

The data for making the model runs was obtained from several sources. Data for the non-rural local exchange carriers (LECs) was supplied by the United States Telecom Association (USTA) based on data for non-rurals received from the FCC. The data for

[12] *See also*, http://www.wutc.wa.gov/rtf

the Rural Carriers was provided by AT&T, at the request of the Task Force, based on runs of the Synthesis Model AT&T had made of Rural Carriers.

There were several known anomalies in this data. Neither the USTA nor AT&T data included Local Number Portability (LNP) costs, although the FCC did adopt and use LNP costs in their determination of support for non-Rural Carriers. The non-Rural Carrier data included the Gallatin River, IL study area, which is actually a Rural Carrier study area. In addition, Rural Carrier study area data was not available for 24 Alaskan study areas nor for the Rural Carrier study areas of Guam, the Virgin Islands and Micronesia. Also, after efforts were made to reconcile study areas between the model data and Universal Service Administrative Corporation (USAC) data, there were over 50 remaining "mismatches" between the two sources. Subsequent to the completion of this study, the FCC issued corrected results for some study areas. This analysis has not, however, been updated to reflect these data corrections.

In spite of these anomalies, the results developed in this study closely match the FCC results. The nationwide average cost for non-Rural Carriers produced by the Task Force study was $23.52, compared with $23.84 for the FCC's initial published results.[13] The corresponding non-Rural Carrier explicit high-cost fund was $262.5 million in the Task Force study vs. $252.1 million produced by the FCC.[14]

In White Paper 2 , the Task Force detailed the numerous and significant differences between Rural Carriers and non-Rural Carriers. These differences are

[13] Based on subsequent changes in the FCC outputs, the current nationwide average cost for non-Rural Carriers produced by the FCC's Synthesis Model is $23.35.

[14] Based on subsequent changes in the FCC outputs, the size of the fund for non-Rural Carriers is now $220 million.

apparent when the nationwide monthly average cost for non-Rural Carriers is compared to the cost for Rural Carriers:

Nationwide Average Cost	
Non-Rural Carriers	$23.52
Rural Carriers	$59.36
Combined	$26.09

It is notable that when the Rural Carriers are included in the nationwide average, the average only goes up $2.57 per month, while the difference between the Rural Carriers as a group and the non-Rural Carriers is $35.84. As documented in White Paper 2, this is due to the fact that the Rural Carriers make up only eight percent of the total nationwide access lines. Also of note, under the current federal universal service rules, Rural Carriers and/or non-Rural Carriers in 52 states and territories receive support. When the FCC non-rural guidelines are applied to the combined rural/non-rural data, carriers in only 16 States would receive explicit high-cost support. Specific study data for individual states may be found in the Appendix D.

More significant, however, is the impact on the determination of explicit support for Rural Carriers resulting from application of the non-Rural Carrier method. When the non-Rural Carrier method is applied to both non-Rural Carriers and Rural Carriers, the following results are produced:

	Non-Rural	**Rural**
Prior Support[15]	$207 M	$1,553 M
FCC Method Support	$241 M	$451M
Difference	+ $34 M	**- $1,102 M**

[15] The prior support shown for Rural Carriers includes amounts from the current High Cost Loop support mechanism, the Local Switching Support mechanism, and the Long-Term Support mechanism. Some Task Force members pointed out that the Long-Term Support mechanism is different in nature than the other two mechanisms because it is used specifically to reduce interstate access rates and that the comparisons possibly should have excluded the Long-Term Support amount of $479 million.

The dramatic decrease in explicit support to Rural Carriers by applying the non-Rural method raised considerable concern among a number of Task Force members that the support provided under these rules would not be "sufficient," and therefore might violate Section 254 of the 1996 Act. It would appear that the primary driver of this decreased level of support is the averaging of costs at the statewide level. This exercise clearly demonstrates that the overall framework of the rules for the calculations, as much as the model tool itself, must be fully considered in developing an explicit support mechanism for Rural Carriers which is consistent with the 1996 Act.

Several alternative support scenarios were analyzed to determine how the results of the combined rural/non-rural Synthesis Model might be used to derive an aggregate high-cost fund support level near the present $1.76 billion of combined high-cost funding.

The first alternative involved reducing the funding "benchmark" to increase the size of the fund to something near the current $1.76 billion. The new non-Rural method provides support for states where the statewide average exceeds 135 percent of the nationwide average forward-looking cost. The results of applying lower funding benchmarks to the combined Synthesis Model data are as follows:

Support Level	Total Support	Number of States
135 percent	$0.7 B	16
125 percent	$1.1 B	17
120 percent	$1.4 B	21
115 percent	$1.8 B	24

The second alternative analyzed involved changing the funding rules to provide funding to all **study areas** (rural and non-rural) where the forward looking cost exceeded 135 percent of the nationwide average, rather than limiting funding to **states** where the statewide average cost exceeded 135 percent of the national average. Implementing this change increased aggregate funding requirements to approximately $3.4 billion. Since this is significantly above current funding levels, higher benchmark levels were applied to determine a funding level approximating the current size.

The results of this analysis are as follows:

Support Level	Total Support	Number of States
135 percent	$3.4 B	44
150 percent	$2.8 B	43
175 percent	$2.1 B	43
200 percent	$1.7 B	42

Analysis of these alternatives highlights the importance of factors other than just the cost development from the Synthesis Model for the overall calculation of universal service support, particularly the development of support based on statewide average costs as compared to study area average cost.[16]

[16] The Task Force did not compute the impact on Rural Carriers of using the current Rural Carrier benchmarks and policies with the Synthesis Model. This was not done for several reasons in addition to the fact that the costs generated by the Synthesis Model are likely to vary widely from reasonable estimates of forward-looking costs. These reasons include the perceived administrative complexity of adapting the Part 36 Rules for calculating the High Cost Loop Fund and Local Switching Support to the Synthesis Model, and the anticipated significant increase in high cost support that would result from such an analysis which would be applied on a study area basis.

In summary, the analysis of applying the non-Rural Carrier universal service rules to Rural Carriers raised significant concerns regarding the suitability of using the non-Rural Carrier methods for Rural Carriers.

III. ANALYSIS OF THE SUITABILITY OF THE NON-RURAL SYNTHESIS MODEL TO RURAL CARRIERS

The analysis was conducted under the *Criteria for Evaluating Proxy Cost Models* that was adopted by the Task Force on November 23, 1999, after extensive discussion and debate. A copy of the *Criteria* document can be found in Appendix B. The criteria established in this document reflect a multi-faceted approach to reviewing the Synthesis Model for Rural Carriers as outlined in the preamble to the *Criteria* document:

> The proxy cost model tool is designed to model a forward-looking network of a monopoly telecommunications provider. While the network architecture may be similar in some respects to existing networks of existing providers, in other respects it may differ, possibly significantly. Evaluation of the proxy cost model tool must thus be done from a variety of viewpoints to make an overall judgment of its use for the purpose of identifying the costs associated with providing the elements of universal service supported service in the serving areas of rural and insular eligible telecommunications carriers. The following criteria provide a variety of methods for evaluating the proxy cost models. Evaluation of these criteria will involve informed judgement, particularly in making determinations of whether there is "reasonable representation" or "reasonable comparability", standards that may have varying interpretations depending on the criteria under consideration. While the models should be evaluated in regard to each of the criteria, judgment will need to be exercised in determining the "sufficiency" of meeting the individual criteria and the overall balance of "sufficiently" meeting the criteria in total.

Attempts were made to evaluate the Synthesis Model (including currently approved input values) for Rural Carriers for each of the established criteria. However, due to the difficulty of data gathering and the limited resources available to the Task Force, evaluations in regard to some of the criteria were limited and conclusions

regarding specific criteria, in a number of cases, can only be tentatively confirmed or cannot be reached. The framework established in the *Criteria* document will also be used for the discussion of the results of this study.

The results of the FCC model evaluation were presented to the Task Force at its meeting on May 25, 2000 in Anchorage, Alaska. The presentation consisted of 145 PowerPoint slides titled *Analysis of the SYN Model for Rural Companies.* This presentation documents the full extent of the analysis, provides detailed data developed during the study, and summarizes the preliminary conclusions of the analysis. Copies of these slides may be found in Appendix E, and are formally adopted into this White Paper.[17] Throughout the remainder of this White Paper, references will be made to the data and analysis documented through these slides.[18]

As documented in S4 – S6, the analysis included a detailed study of 23 sample companies, and a comparison of model results to actual company data for 195 additional companies.[19] The 23 sample companies studied were selected to achieve a sample that is both geographically diverse, and includes companies across the spectrum of size. In terms of geography, the sample includes:

New England	1
Other Northeast	3
Southeast	3
Upper Midwest	4
Lower Midwest	2
Mountain	3
Southwest	4
Northwest	2
Alaska	1

[17] *See* http://www.wutc.wa.gov/rtf

[18] Individual slides in Appendix E will be referenced by an abbreviation. Slide 2, for example, will be abbreviated as S2.

[19] The 13 companies in the "large company" group are included in other groups as well.

Insular	1[20]

The size of the companies, in terms of access lines, included in the sample is as follows:

Under 500	2
500-2,000	4
2,001-5,000	7
5,001-10,000	4
10,001-50,000	4
over 50,000	2

Also included in the analysis were comparisons to actual cost and investment data for several groups of Rural Carriers, including the following: 35 Missouri LECs, 35 Illinois LECs, 17 Oregon LECs, 17 LECs in Utah/Idaho, 91 of the TDS companies, and 13 companies over 20,000 access lines in size. These groups of companies were used to provide a broader spectrum of comparisons to actual company results.

In reviewing the Synthesis Model for suitability to Rural Carriers, a number of potential problems were noted in regard to its ability to produce valid and workable results for certain Rural Carriers. With respect to Rural Carriers in Alaska, the underlying data for Alaska companies appears to be in the model databases. However, the model tables that are used to run the model contain references only for Anchorage Telephone Utility. Thus, in the current model it is not possible to run the model for other Alaska LECs without making model modifications. In addition, tables for the Alaska LECs reflect Anchorage as the tandem switch location for all Alaska LECs. As currently configured the model would calculate transport costs based on constructing a terrestrial fiber network between each wire center and Anchorage, rather than reflecting current

[20] The total of the companies equals 24 since the insular company is also the New England company.

satellite technology interoffice transport that has been deployed to serve many rural Alaskan regions.

With respect to insular areas such as the Virgin Islands, Guam, Micronesia, Palau, and American Samoa, there is currently no data in the model available to develop costs for these areas. In order to rectify this situation, extensive data gathering would be required that would include, but not be limited to: exchange boundaries; tandem locations; soil, water depth and other geographic data; data equivalent to census data; and road data for geocoding surrogates. At present, there does not appear to be an application of the model for insular areas.

The model appears to have certain inherent inconsistencies with respect to identifying study areas. The comparison of model results in January, 2000 to USAC data, even after considerable manual effort to reconcile study area inconsistencies, still resulted in over 50 unmatched study areas between the two lists. If the model is to be used, these lists would need to be reconciled and administrative procedures would need to be established to update the model on a regular basis as study areas change over time.

In White Paper 2 titled *The Rural Difference*, the Task Force has documented the numerous and significant differences between Rural Carriers and Non-Rural Carriers. Even more significant in explaining and understanding the results of the FCC model study, White Paper 2 documents the extensive differences among the universe of 1,300 Rural Carrier study areas. The Executive Summary section of White Paper 2 contains a synopsis of the differences identified and documented in its 82 pages of text and appendices. The following outline lists these differences, and indexes them in a manner that will facilitate the analysis of the FCC model study against the evaluation criteria

established by the Task Force. Appendix A contains excerpts from that Executive Summary.

Major Differences Identified in White Paper 2

1. Rural Carriers' operations tend to be focused on more geographically remote areas of the nation with widely dispersed populations.
2. There is significant variation in study area size and customer base among Rural Carriers.
3. Isolation of areas served by Rural Carriers results in numerous operational challenges.
4. Compared to non-Rural Carriers, the customer base of Rural Carriers generally includes fewer high-volume users, depriving Rural Carriers of economies of scale.
5. Customers of Rural Carriers tend to have a relatively small local calling area and make proportionately more toll calls.
6. Rural Carriers average fewer lines per switch than non-Rural Carriers providing fewer customers to support fixed network costs.
7. Total plant investment per-loop is substantially higher for Rural Carriers than for non-Rural Carriers.
8. Plant specific and operations expenses for Rural Carriers are substantially higher than for non-Rural Carriers.

The remainder of this paper includes an evaluation of the results of the model study in comparison to the Task Force adopted *Criteria*. Frequent references will be made to the detailed study data presented in Appendix E. References made to the differences documented in *The Rural Difference* will help explain conclusions drawn from the data.

I. Model Structure

Task Force Structure Criterion # 1 – FCC Model Criteria[21]

1. The model structure should be evaluated in relationship to the ten criteria established by the FCC in its Report and Order in CC Docket No. 96-45 (FCC 97-157) released May 8, 1997, paragraph 250.

[21] The remainder of the paper details the analysis of each of the model results compared to the criteria established by the Rural Task Force. These criteria, as contained in Appendix B, will appear in bold type at the beginning of each section.

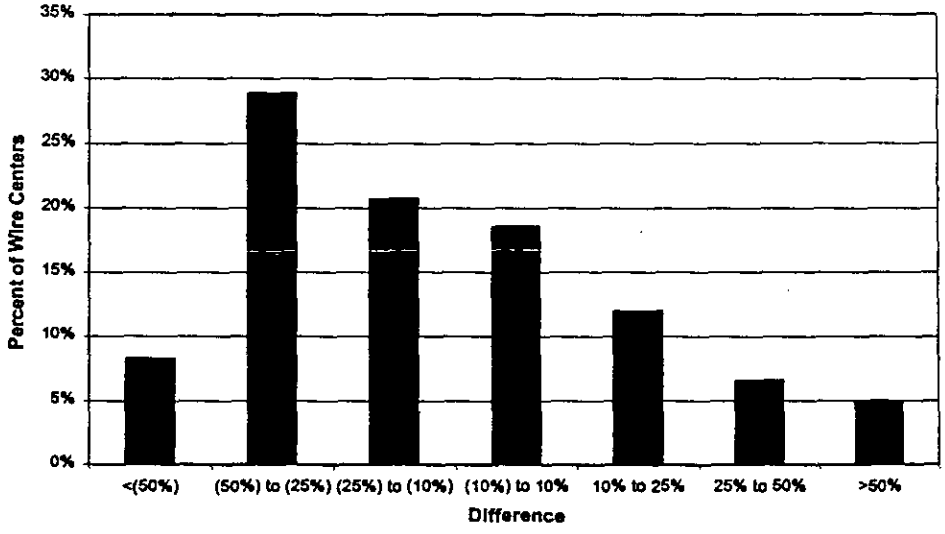
The detailed analysis of the Synthesis model vis-à-vis the FCC criteria can be found S11 – S24:

FCC Model Criterion # 1 – Least cost, most efficient network

In summary this criterion states that the model should use current wire center locations, with a loop design that does not impede the rollout of advanced services. The wire center line counts should match actual line counts, and the average model loop length should reflect actual average loop length.

As a result of the analysis, we observe that the model does use current wire center locations. The Task Force did not explore or analyze the network design, but accepted that the model reasonably meets the forward-looking least cost design criterion. Because of the lack of availability of average loop length data, the Task Force did not attempt to test the loop length criterion. The Task Force did review the wire center line counts in comparison to actual line wire center line counts for 242 wire centers in the sample companies.

Chart 1 - % Difference in Model Line Counts vs. Actual



As shown in the table above, there are substantial variations in wire center line counts for the sampled companies compared to the actual wire center counts.[22] Chart 1 shows that in less than 20 percent of wire centers does the model come within ±10 percent of actual line count. It should also be noted that almost 60 percent of wire centers have a model line count greater than 10 percent under actual, while eight percent have an undercount in excess of 50 percent. This could be due to several of the rural differences identified in White Paper 2. Most significant could be difference #1, the remote nature of the territory served by most Rural Carriers, and #2, the wide variation in size and population density. The model uses census data and road data to locate customers. In sparsely populated areas the lower accuracy of this input data could lead to undercounting, as observed in Chart 1. While it might be possible to gather data from all companies at a wire center level to provide more appropriate line counts, this would require a substantial administrative effort. The Task Force did not test the Synthesis Model procedures when wire center line count inputs are provided to validate the appropriateness of the procedures used to develop costs for line counts different than those generated within the model.

FCC Model Criterion # 2 – All functions have a cost

This second criterion requires that all network elements must have a cost associated with them. It was noted that although the FCC had ordered the inclusion of costs for LNP, that cost was apparently not included in the model results, at least in the area of the HAI model where that cost normally appears. The results of the analysis produced no other observations wherein the model did not comply with this criterion.

FCC Model Criterion # 3 – Forward Looking cost

The third criterion calls for model costs to be forward looking costs and to not include the embedded costs of the companies being modeled. Our observations with respect to this criterion are that the model cost structures and inputs are generally considered to be forward looking.

FCC Model Criterion # 4 and #5 – Rate of Return and Depreciation

The fourth criterion requires the calculated rate of return to be at the currently authorized FCC level of 11.25 percent, and the fifth criterion states that capital recovery (depreciation rates) must fall within current FCC guidelines. The 11.25 percent rate of return is reflected in the model. No specific analysis was made of the depreciation rates used.

FCC Model Criterion # 6- Costs estimates for all services

The sixth criterion sets forth that the model must estimate costs for all services including residential, business, second lines, and special access. Our observations from the analysis are that the model parameters are set to attempt to estimate costs for all of the requisite services. No specific tests to evaluate this criterion were made beyond the access line comparisons at a wire center level referenced in regard to FCC Criterion #1. We note, however, that in the output reports for the sample companies, none of these companies showed any single-line business lines.

FCC Model Criterion # 7 – Joint and Common Costs

The seventh criterion requires that a reasonable allocation of joint and common costs must be allocated to supported services. No specific analysis was made in regard to this criterion. However, observations related to network support expense, customer

[22] *See* S13 in Attachment 2 for additional details.

operations expense and corporate operations expense presented later in this paper may be related to this criterion.

FCC Model Criterion # 8 – Ability to examine underlying detail

The eighth criterion provides that the formulae and computations supporting the model logic will be readily available for review. In addition, the underlying data must be verifiable and the outputs plausible.

Our observations are as follows. We did not attempt to conduct a review of the program logic used in developing the loop cost. The record in the non-rural proceeding is replete with evidence regarding the difficulty in reviewing this section of the model.

The documentation related to the model is limited and not well organized. Some critical information for running the model is contained only in the "history" document available on the FCC web site and not in the operating manual. The user interface for choosing companies was confusing.

The model integration between the FCC staff developed loop model and the HAI modules that are combined to form the Synthesis model is sometimes confusing. For example the Uniform System of Accounts[23] (USOA) output worksheet is not properly programmed for network operations, corporate operations, and customer operations expense. The structure sharing assumptions displayed in HAI output modules do not reflect actual model use of these assumptions since they are apparently applied within the loop portion of the model, rather than in the HAI modules. The cost of UNE elements developed by and displayed in the model are incorrect since all of the corporate overhead expense (network operations expense, customer operations expense, and corporate

[23] The Uniform System of Accounts is the system of financial accounting reporting prescribed by the FCC. The rules are contained in Title 47, Part 32 of the Code of Federal Regulations.

operations expense) is included with the Network Interface Device (NID) cost element,[24] and several expense-related inputs (e.g., corporate overhead, and expense/investment relationships) appear to be hard-coded in the program.[25]

FCC Model Criterion # 9 – Critical Assumptions

The ninth criterion provides that the model must include the capability to examine and modify both critical assumptions and engineering principles. Our observations are that model assumptions are generally available via separate inputs, although the ability to examine these assumptions is hampered in some respect by model structure issues as discussed above in the criterion #8 section. As noted in criterion #8, some inputs appear to be hard-coded into the program and cannot be changed via user specified inputs.

FCC Model Criterion #10 – Level of support calculation

The tenth criterion requires that support be deaveraged to at least the wire center level and preferably to smaller areas. Our observations are that the model does calculate support at the wire center level. Some costs are calculated at the cluster level, but support levels are not.

Task Force Structure Criterion #2. The network "built" by the model reasonably represents a network that would be built in the real world by a telecommunications company to provide the same service levels and technology as assumed in the model.

a. At a wire center level the physical location of the network that is built is reasonably within the confines of the actual wire center boundaries.

[24] $7.32 per line cost is hard coded in cell C33 of the Per Line worksheet and is the only value totaled in cell C35 of the Per Line worksheet. The calculation of the total NID cost in column GM of the Investment Input worksheet includes the product of C35 of the Per Line worksheet times the total lines.

[25] *See previous footnote.* Also see, for example, cell H19 of the 96 Actuals worksheet, which appears to be hard-coded. This value is used in calculating COE switching expense in columns DS, EZ, and FB of the Investment Input worksheet.

An attempt was made to gather wire center maps from the sample companies and compare these maps to the electronic wire center maps, with the location of the model-built network, and with the census block group maps assigned to wire centers. A number of problems were encountered and this analysis was not completed. However, the Task Force obtained some maps which demonstrate potential concerns. Slides S26 and S27 show maps made available by Sprint of their operating territory in two states. A number of discrepancies can be identified between the actual and mechanical exchange boundaries. In the context of a study area with a large number of exchanges, these do not appear to be large. However, if put in the context of a one or two-exchange study area, some of the differences could be substantial. Slide S28 shows a map prepared by the National Exchange Carrier Association (NECA) of an individual study area demonstrating that the network locations built by the model in some instances fall outside the boundaries of the exchange. In Rural Carrier situations, these anomalies could result in significant cost variations.

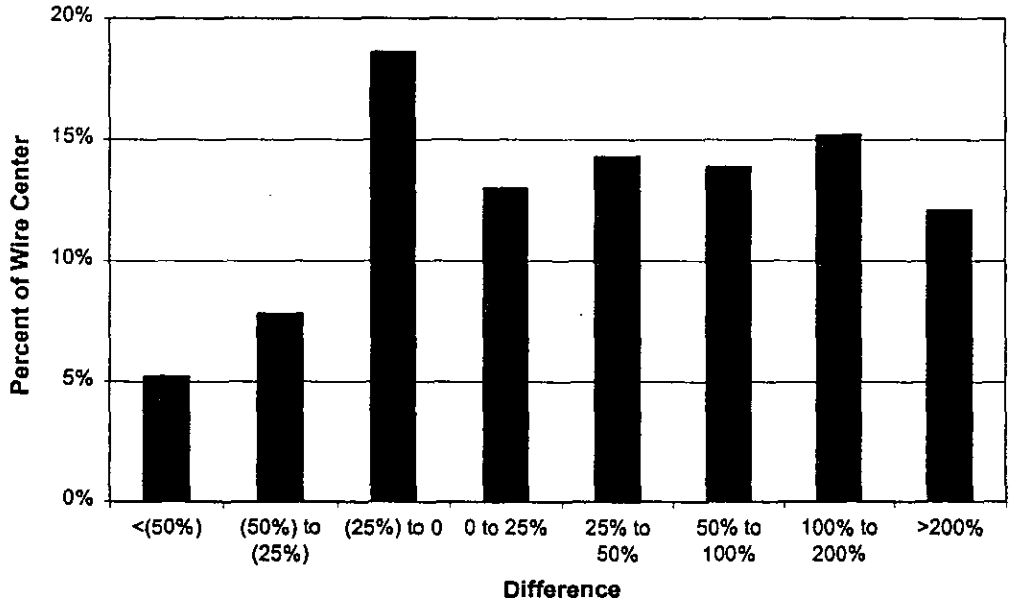
b. At a wire center level the route mileage of plant built by the model is reasonably sufficient to serve the customer locations.

This aspect of the analysis involved comparing the route mileage from the model (feeder and distribution plant footage)[26] to actual plant route mileage as reported by the sample companies for 231 wire centers. Comparisons were made with the recognition that actual data might include some interoffice facilities and therefore might be biased toward being larger than model results. Chart 2 shows a comparison of model-developed route miles

[26] Model results were taken from columns AK and AL of the Investment Input worksheet.

to actual (S31). This data shows an underestimation of route miles in 32 percent of wire centers and an overestimation in 68 percent, with 12 percent being overestimated by more than 200 percent. No attempt was made to review the model logic to determine the development of model data and there is concern as to whether the comparison between the model results displayed and actual route miles is valid.[27]

Chart 2 - Model Route Miles vs. Actual



c. Cluster locations for digital loop carriers are appropriately located so that the 18,000 foot maximum copper loop length is not exceeded using rights-of-way that are actually available.

In a presentation made by Rural Utilities Services[28] (RUS) to the Task Force an example showed that cluster locations generated by the model did not reflect appropriate

[27] The widest variation for a single wire center had model results of 1,032 miles in comparison to only 87 actual route miles.

[28] The Rural Utilities Service is a Rural Development Agency of the United States Department of Agriculture. Formerly the Rural Electrification Administration, the RUS finances and provides technical support to approximately 825 rural telephone companies and cooperatives serving about 5.5 million rural households and businesses.

loop lengths when measured using available rights-of-way. The Task Force had hoped to conduct further analysis in this area, but was unable to do so.

d. At the wire center level, calculated access line counts for residence and business customers are consistent with actual wire center access line counts, assuming that such wire center access line counts can be obtained.

Three separate analyses were done in relationship to this criterion. The first analysis of actual total access line counts was previously presented in relationship to FCC Criterion #1 and showed that there was significant variation in total line counts. A second analysis was made comparing residence lines to households (S36). This analysis showed that over 30 percent of 274 wire centers had exactly one residence line per household, and over 50 percent of the wire centers had between 1.0 and 1.05 residence lines per household. A third analysis compared the percent of residence lines to total lines developed by the model in comparison to actual results (S37). In over 25 percent of the wire centers, the percent of residence lines to total lines was 20 percent or more higher in the model than in actual results, and in over 55 percent of the wire centers the percent of residence lines was 10 percent or more higher in the model.

e. The type of outside plant built by the model (e.g. aerial, buried, or underground) is reasonably consistent with the type of plant actually being used in new construction in the study area.

Analysis of this criterion was conducted on both the sample companies and the larger groups of companies. Actual percentages of buried, aerial, and buried plant (measured in dollars) as compared to model-developed percentages were compared. As detailed on S40 – S42, the model generally overestimates the percentage of aerial and underground plant and underestimates the percentage of buried plant. On average, the company groups show actual buried plant percentages in the high 85 percent to 95 percent range as

compared to model results in the 50 percent to 60 percent range. Actual plant deployment varies widely between companies in each of the groups. These differences can be explained by the simple fact that the model uses a single set of national inputs by density zone, which is predicated on the experience of non-Rural Carriers. As documented in White Paper 2, Rural Carriers serve more remote areas (Difference #1) and experience significant differences among themselves in terms of the size of their study areas and in customer density (Difference #2). In addition there is a wide range of geographic, climatic and soil challenges faced by Rural Carriers (Difference #3) which would further cause predicted and actual values to differ greatly among Rural Carriers.

Task Force Structure Criterion #3. There is consistency between the model structure and its use of inputs and the basis upon which the model inputs were developed.

a. Assignment of specific network components to the model's density zones for cost development is consistent with the method used in developing the cost and other assumptions that vary based on those density zones.

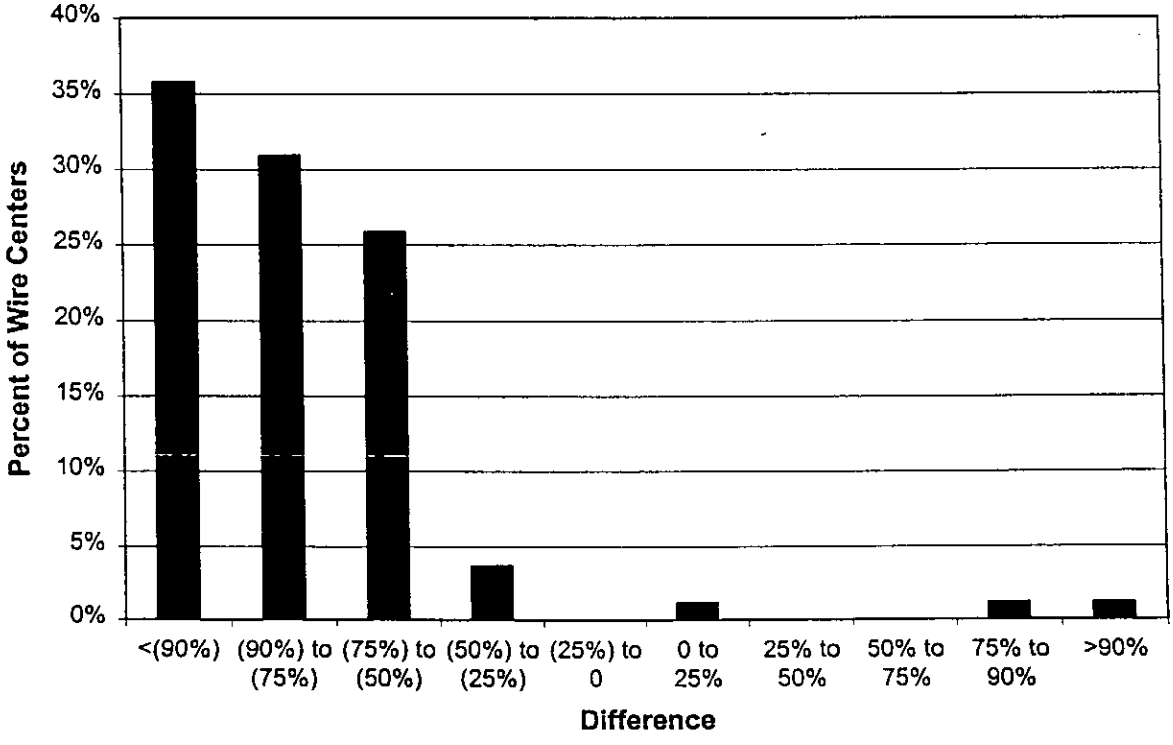
The Synthesis Model relies heavily on the density classification of particular areas to determine many of the cost factors used in the model. For example, the type of plant constructed (aerial, underground or buried) as well as the cost of its placement is determined by a single nationwide look-up table based on density. Structure sharing percentages are also based on density zones.

In the HAI and BCPM models that preceded the Synthesis Model, density was calculated on a Census Block Group basis and inputs for the model were based on these calculations. While inputs adopted for use in the Synthesis Model frequently were based on inputs from the two prior models, in the Synthesis model density is calculated on a different basis. It is determined by using the area inside a "cluster."

Two types of analysis were conducted to test the impact of these different density calculations. First, slides S47 to S51 show comparisons of the density zone distribution for five sample companies and illustrate that the density zone assignments used in the HAI model and those used in the Synthesis model vary widely. Additionally, in the case of a single line cluster, the Synthesis Model assigns such areas to Density Group 4 (200 to 650 lines per square mile). A single line cluster will occur when a customer is so remote from other areas that a DLC remote cannot be located so as to serve more than one location and maintain the 18,000 foot maximum copper loop limitation. It is thus curious why the mildly suburban Density Group 4 cost characteristics are used for such lines.

The second analysis conducted compared actual wire center areas provided by

Chart 3 - Modeled Wire Center Area vs. Actual



nine of the sample companies in 81 wire centers with the wire center area used in the Synthesis Model in determining density calculations. On an overall basis, the model calculated 6,736 square miles as compared to the actual area reported by the companies of 57,830 square miles. On an overall basis the model density equated to 6.1 customers/square miles while the actual data showed a density of 0.8 customers/square mile. Chart 3 clearly shows the serious understatement of wire center area in the density calculations in the Synthesis Model. In 95 percent of wire centers the area is understated, and in over one third of these, the understatement exceeds 90 percent. Again, the remote character of most Rural Carrier areas could be a contributing factor to this underestimation.

II. Model Inputs

Task Force Input Criterion #1 - There is sufficient variability in model inputs to reflect cost differences reflected by forward-looking efficient rural companies with varying circumstances such as, geographic differences, cost of labor, purchasing power, geographic isolation, company size, etc.

a. **Cost of cable reflects cost of cable purchased in both contract and work order quantities by companies with varying purchase discount capabilities and varying transportation cost requirements.**

In determining final input values for non-Rural Carriers for cable and wire facilities, the FCC included a volume discount factor in determining the cost of cable. This discount was intended to recognize volume discounts that large companies were perceived to be able to negotiate in comparison with the RUS companies upon whose data the costs were developed. S55 – S57 documents the cost of cable used for non-Rural Carriers in comparison to costs calculated using the FCC regression analysis, but eliminating the volume discount factor. Use of the model for Rural Carriers should be based on different input values for cable and wire than were used for non-Rural Carriers.

The Task Force attempted to gather data from the sample companies to compare specific costs for certain cable items. However, these attempts did not generate sufficient responses to make any meaningful comparisons.

b. **Cost of other purchased items reflect variations in cost encountered because of transportation costs, geographic location, and varying purchase discount capabilities.**

The Task Force also made a limited attempt to gather data from sample companies regarding other items, but was unsuccessful in generating any meaningful sample results.

c. **Assumptions regarding the type of outside plant (e.g. aerial, buried, or underground) reflect the type of construction that is reasonably expected to be built in the location being modeled. Factors affecting the type of outside plant such as weather and geography will be reasonably reflected in plant construction type assumptions. Statutory and regulatory requirements affecting the type of outside plant will also be reflected unless specific policy determinations preclude giving these requirements consideration.**

As discussed in 2.e., above, the Synthesis Model overstates aerial and underground plant, and understates buried plant. The model results generally do not reflect the diversity in operating areas shown in actual plant deployment decisions. Given the diversity of Rural Carriers serving areas, it is unlikely that a single set of inputs (See S62) would produce results consistent with actual experience (S62). Also, many Rural Carriers are RUS borrowers. RUS rules generally require the use of buried plant, which could account for some of the observed discrepancy.

d. **Structure sharing inputs will be reasonably consistent with construction methods that would be used for new construction of communications facilities in the specific area. When structure sharing is assumed, cost**

inputs for structures will reflect the cost of building structures that are consistent with sharing assumptions.

The Synthesis Model's "structure sharing" assumptions stem from the perception that in some cases, the cost of constructing cable structures (pole lines, trenches for buried cable, conduit) should be assignable to more than one facility provider. It is assumed that outside plant structures may be shared among and between LECs, cable operators, electric utilities, and others that include competitive access providers and interexchange carriers. The "sharing" may involve the sharing of poles for aerial cable, the sharing of conduit for underground cable, and the sharing of trench for buried cable.

In analyzing the structure sharing assumptions for the non-Rural Carriers (S66) a calculation was first made of the average "lot" size that would occur at the upper end of each density zone (S65) Judgmental comparisons were then made comparing the sharing assumptions for the density zones to the type of area that would be served, based on the range of lot sizes in the density zone. No exhaustive analysis was done, but the questions posed in S67-S69 shows the type of questions that should be answered in evaluating these inputs. The general observations were that the structure sharing assumptions used in the Synthesis Model should be closely reviewed if the Synthesis Model is used for Rural Carriers.

e. Expense inputs for such items as customer and corporate operations expenses will recognize the impact that company size has on these expenditures.

The Synthesis Model uses a fixed amount per line based on Regional Bell Operating Company (RBOC) data and regression analysis developed by the FCC staff. The differences between Rural Carriers and non-Rural Carriers and within the Rural Carrier subset identified in White Paper 2 suggest that appropriate and efficient expenses

for Rural Carriers are likely to vary significantly on a per line basis. Analysis of the output results for these expense items demonstrates a concern regarding the appropriate input levels for these items.

Analysis of traffic inputs of the Synthesis Model

While the *Criteria* developed by the Task Force did not include reference to the traffic inputs, some analysis was performed related to those inputs in the Synthesis Model. While a few of these factors, such as the percent of total traffic that is interoffice, are included in the user input section of the model, many of the factors affecting traffic volumes are included in an Automated Reporting Mechanized Information System (ARMIS) data file that is a separate model input file. While for large non-Rural Carrier study areas these files are created at a study area level, for Rural Carriers a single composite file using average RBOC traffic data on a per line basis is the source of data. These factors and inputs result in model assumptions that 68.21 percent of traffic originated in all Rural Carriers is local traffic and that 48.69 percent of the local traffic is interoffice (extended area service) traffic.

Analysis of traffic data from eighteen of the sample company study areas was conducted. While total traffic and local traffic volumes for the 18 companies combined produced results within five percent of the model estimated amounts (S74), individual company results showed substantial variations (both high and low) from the model results (S75). Local interoffice traffic generated by the model was 85 percent higher than actual traffic for the companies in total (S74), but individual company results were again widely variable. In reviewing the impact these assumptions have on universal service costs, it

should be recognized that they are significant drivers in the calculation of end office and transport costs that are included in the universal service cost total.

III. Model Outputs

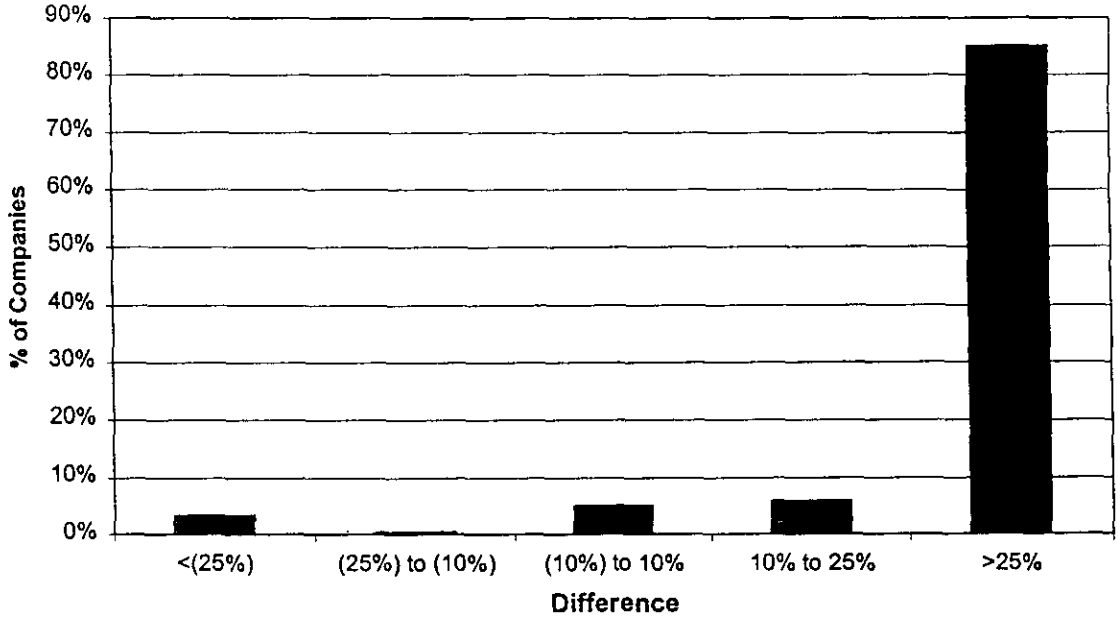
Comparisons of model outputs to actual company data must be made with some care and specificity since network design features may differ from those in actual service and company functions modeled for universal service do not encompass the full range of functions actually performed in an operating company. Cost differences resulting from the historic age of actual plant also must be recognized in making such comparisons and in making judgments on the "reasonable comparability" of such information.

Task Force Output Criterion #1 - Investment results produced by the model should be reasonably comparable to actual investment amounts in companies where the network elements in service are similar in technology and age to the network elements being modeled.

a. **Outside plant investment results should be reasonably comparable to actual investment amounts in those companies or wire centers where the outside plant architecture has unloaded loops and digital loop carrier architecture with recent construction periods.**

For most companies the model network design is substantially different from the existing network, with a generally more robust (and substantially more expensive) network design. Cable and Wire Facility (C&WF) is a long-lived asset. In general, historical embedded cost would be expected to be less than forward-looking cost because of cost increases in cable and labor over historical rates. The impact of these two factors as shown in Chart 4 indicates that in nearly 90 percent of the cases from the sample company and company groups, the model produces C&WF investment greater than is actually in place. For the large groups these variations range from 70 percent higher in the Oregon and the TDS companies, to around 145 percent higher in the Illinois and Missouri company groups. (S80-S81)

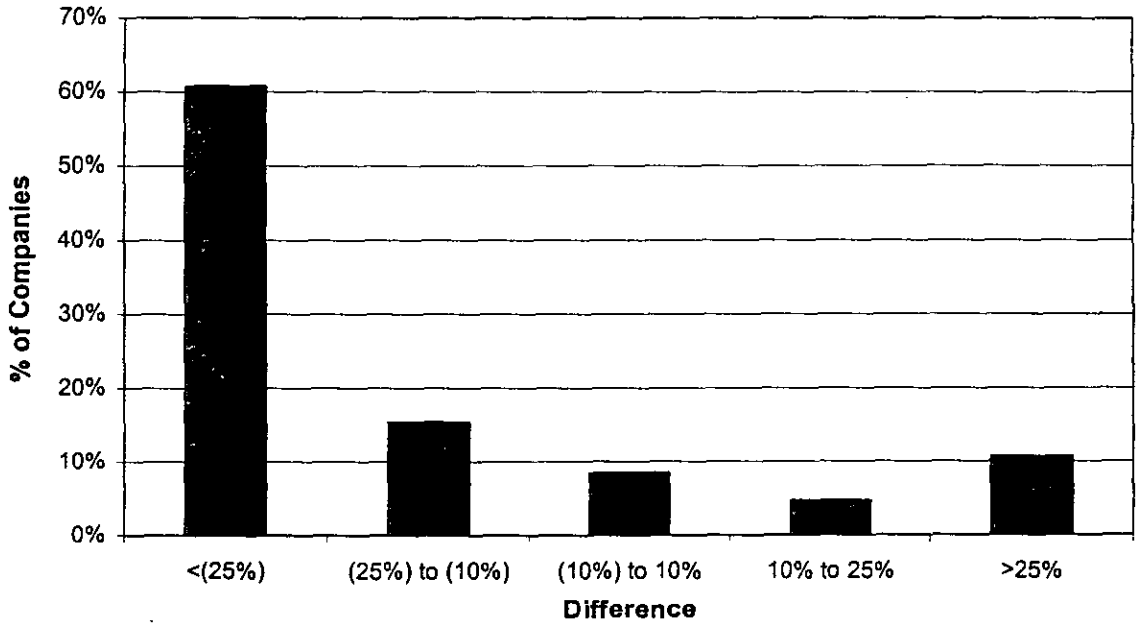
Chart 4 - Modeled C&WF Investment vs. Actual



A more relevant comparison to test the validity of the model output would be a comparison between model C&WF results for individual companies that had recently rebuilt their networks using a comparable network architecture to the modeled network. In attempting to make this type of comparison the Task Force was able to gather only a limited amount of data. S83 compares the number of clusters actually deployed in 11 wire centers in four different study areas with the modeled number of clusters. S84 documents a study of two sample companies where full DLC deployment would allow a test of the Synthesis Model's cost development in comparison to actual deployment cost of a similar network. In these two examples, costs varied widely between the model and actual cost levels. However, the sample was too small to reach any general conclusions.

b. **Central office switching investment results should be reasonably comparable to actual investment amounts in those companies that have digital switches with SS7 capabilities.**

Chart 5 - Modeled COE Switch Investment vs. Actual



While the modeled network for C&WF may be significantly different than the deployed network, that is not true in the case of Central Office Equipment (COE) switching equipment. For Rural Carriers the switching equipment that is deployed is the same equipment the model is based on: digital switches with the latest features required such as interchangeable NXX capability, 4-digit Carrier Identification Code (CIC) capability, and intraLATA presubscription capability. Communications Assistance for Law Enforcement Act[29] (CALEA) features are rapidly being deployed.

[29] Pub. L. No. 103-414, 108 Stat. 4279 (1994) (codified as amended in 18 U.S.C. §2522, and 47 U.S.C. §§ 229, 1001-1010).

Analyses of the model results with the actual investments for the large groups of companies were performed. Chart 5 clearly shows that for most sampled companies, COE switching investments in the Synthesis Model are significantly less than actual investments (S88). Summarized results for the groups of companies show the model results for the Missouri companies at 6.5 percent greater than actual, but the model results for the other groups vary between 25 percent and 44 percent less than actual (S87). While overall company model results tend to be low, there are also many examples of high results as well.

c. General support investment results (vehicles, general purpose computers, land, buildings, work equipment, furniture, etc.) should be reasonably comparable to actual investment amounts, giving consideration to cost differences due to age and operational differences.

In analyzing the output results of the model for general support assets, comparisons were made between results of the model to actual plant in service for several specific components in this group of assets.

Land: Investments in land are long-term investments made over a considerable period of time. Since land costs are generally considered to have risen substantially over the last twenty to thirty years, it would generally be expected that historical costs of land would be less, probably substantially less, than the forward-looking cost of land. Comparisons of model results to actual for the various groups of companies differ somewhat (S92). As expected, for the group of large companies the modeled land investment is 22.9 percent greater than actual investment. However, for the remaining

groups of companies, the modeled land investment is less than the actual investment, ranging from 0.3 percent less for the Missouri group to 75.6 percent less for the Oregon group. Five of the seven groups have modeled land investment more than 24 percent below actual investment. Comparisons of individual company results (S93) demonstrate the wide individual company variations with the bulk of the companies (nearly 80 percent) having both high and low variations of greater than 25 percent from actual results.

Buildings: Buildings are another asset with long lives and rising costs over time. Based on this general knowledge, one could expect that forward-looking building costs would be generally greater than historical embedded costs. Analysis of the group results (S96) again are widely varied with modeled building costs ranging from 113 percent higher than actual in the Missouri group, to 13.5 percent less in the Illinois group. While the overall results are more in keeping with expectations, analysis of the individual company results (S97) again shows the bulk of the companies (approximately 70 percent) with modeled results greater than 25 percent different from actual results.

Vehicles: Vehicles are an asset with a relatively short life, although vehicles costs have generally been increasing over time. Expectations for comparisons between actual and forward-looking costs would be for the forward-looking costs to be modestly greater than actual. Analysis of the groups (S100) shows modeled vehicles costs substantially lower than actual with results varying from 16.9 percent lower in the large company group, to 59.8 percent lower in the Oregon group. Individual company results (S101) show the large majority of companies with modeled investments more than 25

percent below actual. However, nearly 20 percent have modeled investments more than 25 percent above actual results.

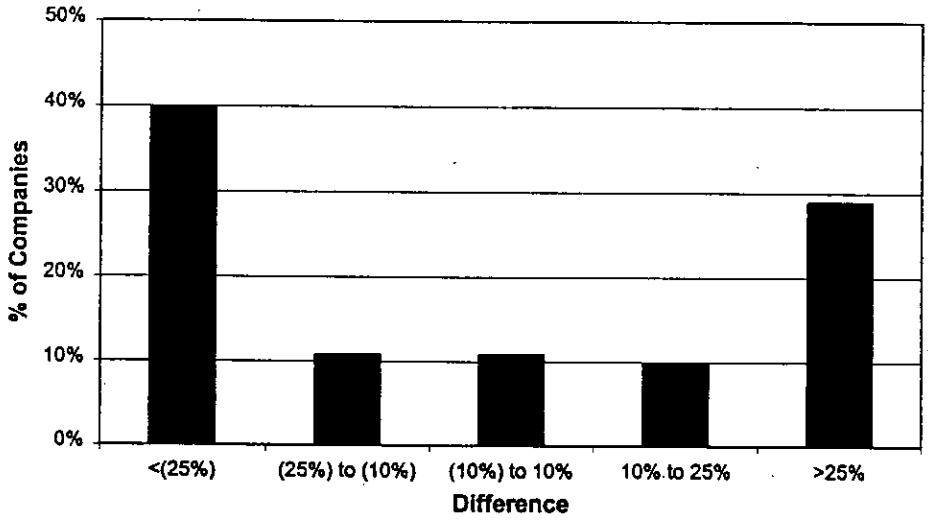
Tools and Work Equipment: This category of equipment is generally of a medium-length life and includes investments in such equipment as trenchers, boring equipment, trailers, backhoes, and other equipment. Costs of the equipment have been rising, leaving an overall expectation that the forward-looking cost would be greater than actual investments. Analysis of this category (S104-S105) shows all groups having modeled investments below actual investments. Results range from modeled results less than 10 percent below actual in the large company and sample company groups, to approximately 25 percent below actual for the Missouri and TDS company groups, to over 50 percent below actual for the Illinois, Oregon, and Utah/Idaho groups.

Furniture and Office Equipment: This investment category contains some investments (desks, credenzas, etc.) with medium to long lives, and others (copy machines, fax machines, etc.) with relatively short lives. Expectations would be for forward-looking results to be modestly greater than actual values. Analysis of the groups of companies (S107-S108) show that in all cases forward-looking results are greater than actual, in many cases substantially greater. Two groups, Illinois and Oregon, have modeled results only 27 percent higher than actual, perhaps in the general range of expectations. However, the remaining groups have modeled investments in this category between 114 percent (large companies) and 193 percent (Utah/Idaho companies) higher than actual.

Chart 6 sums the General Support investment categories and demonstrates the wide variability of predicted vs. actual results within the Rural Carrier universe. If the

Synthesis Model was a good predictor of actual investment, you would expect to see a statistically "normal" distribution of results about the mean. That is, the largest number of observations would be in the middle, and outliers would trail off at the extremes. What this data, and other data within this analysis shows is that the largest number of observations occurs at the extremes - precisely the opposite result that one would expect

Chart 6 - Modeled General Support Investment vs. Actual



if the model were an accurate picture of reality. This further underscores the wide diversity within the Rural Carrier universe, and the difficulty that will be encountered in constructing a model to accurately estimate costs for individual companies within this universe.

Task Force Output Criterion #2 - Expense results produced by the model should be reasonably comparable to actual expense amounts for similar functions being conducted by the company, or by a similarly situated company or companies, to those that are being modeled.

a. Modeled plant specific expense results should have reasonably similar relationships to modeled plant investment results as do existing plant specific expense and investment amounts.

S114 – S118 summarize the analysis of plant specific expense relationships to investments performed using the groups of companies. Modeled COE switching ratios differ among company groups with some higher and others lower than modeled results. COE transmission ratios vary somewhat both between groups and between the modeled and actual relationships, but are reasonably close to model estimates. C&WF ratios of expense to investment do not vary significantly with groups, but actual ratios tend to be higher than model predictions.

b. Modeled customer operations expense results should be reasonably comparable to actual customer operations expense amounts for the functions being modeled.

Comparisons of customer operations expenses between modeled results and actual results must be made carefully, since the modeled results do not intend to capture customer operations expenses for a number of non-universal service related customer operations expenses that are a part of normal telephone company operations. These non-modeled functions include activities such as toll billing functions, carrier access billing functions, and marketing. In analyzing the comparability of customer operations expenses between actual and the modeled results, comparisons were developed, without adjustment, for the large groups of companies (S120). Model results, as anticipated, are substantially below total actual customer operations expenses.

To further test the appropriate level of customer operations expense, an analysis of customer operations expense assigned to the local and loop functionalities by

separations studies for 19 sample companies was conducted. The results (though somewhat understated due to some missing data) show that on average for these companies the "local" customer operations expenses are approximately $3.80 per line (compared to the model input of $3.71 per line) or 46 percent of total customer operations expense. Individual company Synthesis Model results varied widely, however, ranging between 26 percent to 78 percent of total customer operations expense and between $1.66 and $15.55 per line per month.

Since the FCC, in the Synthesis Model inputs, treated network operations expense similar to customer operations expense, analysis of modeled network operations expense to total company network operations expense was performed for the groups of companies. Rural Carriers generally have relatively small amounts of interoffice and toll facilities, so the large majority of network operations expense for these companies result from the provision of supported services. As shown on S125, modeled network operations expense ranged from 60 percent to 73 percent below actual expenses in this category.

b. Modeled corporate operations expense results should be reasonably comparable to actual corporate operations expense amounts for the functions being modeled.

Comparisons of actual corporate operations expense to modeled expense must also recognize the overall company functions that are not included within universal service modeling. In order to provide one view of such an analysis, data from 19 sample companies' separations studies were used to develop ratios of corporate operations expense related to universal service functions to total operations expense. This analysis indicated that between 60 percent and 70 percent of corporate operations expense should

be related to modeled functions. Comparisons of actual total corporate operations expense to modeled expense (S129) showed model results between 70 percent below and 90 percent below actual costs. These results indicate that modeled expenses in this category are well below appropriate levels.

IV. Model Results

Task Force Model Results Criterion - Comparison of model results between companies are reasonably consistent with general expectations of relationships of costs for various cost components to such factors as density, size of the geographic area served, size of wire centers, and number of lines served.

Analysis related to this criterion was presented in four different sets of data. Analysis was presented regarding the weighted average of costs for the sample companies by cost category - i.e. loop, port, end office usage, signaling, and transport - and comparisons were made to the high and low value for each category cost (S134). Of some interest in this analysis is the amount of the total cost in the transport area, particularly the highest value for this category of $55.95 per loop per month.

S135 – S137 shows an analysis ranking the 23 sample companies from high cost to low cost and showing density, average wire center size, and company size. There is some correlation between low density and high cost, but other factors introduce variations beyond just density considerations. For example the company with the fourth highest overall cost has the highest density of any of the sample companies.

S138 – S140 ranks the companies in order of loop cost from high to low, but displays the ranking based on overall cost. While again there is a correlation between loop cost and density, there are clearly other factors impacting the loop cost. Loop cost ranking is similar to, but not identical to the overall cost ranking.

S141 – S143 analyzes the results by ranking the companies from high to low cost for the sum of the port and end office switching costs. The rank displayed is the overall cost ranking. Comparisons are made to average wire center size and total company line size. The sum of the signaling and transport costs are displayed. Review of this data shows a degree of correlation between switching costs and the average wire center size. The wide variation in transport and signaling costs ($1.42 to $62.09) is also evident along with the substantial signaling and transport costs developed for many of the companies.

IV. Summary

In reaching its conclusions regarding the proposed use of the Synthesis Model as the basis for developing federal universal service support for Rural Carriers, the Task Force did not review or debate individual elements of the analysis presented above and their overall relevance individually in reaching any conclusion. Undoubtedly, different Task Force members found different parts of the analysis more or less compelling in reaching their overall judgment regarding the adequacy of the Synthesis Model for the proposed task. However, the totality of the analysis was sufficient to lead the Task Force as a whole to conclude that the Synthesis Model was not the appropriate tool to recommend for use for developing federal universal service support for Rural Carriers.

Appendix A

Major Differences Identified in White Paper 2

1. **Rural Carriers' operations tend to be focused on more geographically remote areas of the nation with widely dispersed populations.**

   a. Rural Carriers serve 8 percent of the nation's access lines, 38 percent of the land area, and 93 percent of the study areas.
   b. Average population density for Rural Carriers is 13 persons per square mile versus 105 for non-Rural Carriers.
   c. On a sample basis, Rural Carriers serve 70 percent of the serving areas with less than 5 lines per square mile, but only ten percent of the serving areas with over 100 lines per square mile.

2. **There is significant variation in study area size and customer base among Rural Carriers.**

   a. The vast majority of access lines served by Rural Carriers are clustered in the largest study areas in terms of line size.
   b. Rural Carriers serving the three smallest study area groupings (2,500 lines or less) encompass 48 percent of all study areas, but only five percent of all access lines served by Rural Carriers. On the other hand, Rural Carriers serving the three largest study area groupings (20,000 lines or more) contain only 10.5 percent of all study areas, but 67 percent of all access lines.
   c. The average population density of areas served by Rural Carriers varies radically, ranging from 0.58 and 1.25 persons per square mile in Alaska and Wyoming, respectively, to over 100 persons per square mile for Rural Carriers in other states.

3. **Isolation of areas served by Rural Carriers results in numerous operational challenges.**

   a. Rural Carriers have relatively high loop costs because they lack economies of scale and density.
   b. Rural Carriers experience difficulty and high cost in moving personnel, equipment and supplies to remote and insular communities.
   c. Geographic surface conditions – such as coral, volcanic rock and permafrost – require expensive specialized outside plant construction practices.
   d. More resources, including duplicate facilities and backup equipment are required to protect network reliability.

4. **Compared to non-Rural Carriers, the customer base of Rural Carriers generally includes fewer high-volume users, depriving Rural Carriers of economies of scale.**

a. On average, multi-line business customers represent 13 percent of total business lines served by Rural Carriers compared to over 21 percent for non-Rural Carriers.
b. Non-Rural Carrier study areas have higher business customer density than Rural Carrier study areas.
c. On average, special access services purchased by large users represent three percent of revenues for Rural Carriers vs. 18 percent for non-Rural Carriers.
d. There is substantial diversity in special access revenues within the Rural Carrier universe ranging from zero percent to 36 percent.

5. **Customers of Rural Carriers tend to have a relatively small local calling area and make proportionately more toll calls.**

a. On average, local minutes average 85 percent of total intrastate minutes for non-Rural Carriers, but only 69 percent for Rural Carriers.
b. The proportion of interstate minutes to total minutes is 21 percent for Rural Carriers vs. 16 percent for non-Rural Carriers.
c. For Rural Carriers, 70 percent to 80 percent of customers can reach less than 5,000 other customers with a local call. Only 10 percent of Rural Carrier customers can reach as many as 25,000 other subscribers.

6. **Rural Carriers average fewer lines per switch than non-Rural Carriers, providing fewer customers to support fixed network costs.**

a. Rural Carriers average 1,254 customers per switch versus over 7,000 for non-Rural Carriers.
b. The average number of lines per switch decreases dramatically as the line size of the study area decreases. Rural study areas with more than 100,000 lines average nearly 3,000 lines per switch compared to 223 lines per switch for study areas with less than 500 lines.

7. **Total per-loop plant investment for Rural Carriers is substantially higher for Rural Carriers than for non-Rural Carriers.**

a. Average per-loop investment is over $5,000 for Rural Carriers, versus less than $3,000 for non-Rural Carriers.
b. Average per-loop investment for Rural Carriers increases as the number of lines in the study area decreases. Average per-line investment ranges from $3,000 for Rural Carriers in the largest study areas to over $10,000 for the smallest.
c. The range of values for total plant investment per loop for Rural Carriers ($1,400 to $40,500) is far greater than the range for non-Rural Carriers ($1,570 to $4,350).

8. **Plant specific and operations expenses for Rural Carriers are substantially higher than for non-Rural Carriers.**

a. Average plant specific expenses per loop are $180 for Rural Carriers versus $97 for non-Rural Carriers.
b. Average Rural Carrier plant specific expenses increase consistently as the number of lines in the study area decreases, from approximately $110 per loop for carriers with more than 20,000 lines to $445 per loop for carriers with less than 500 lines.
c. The range of total plant specific expenses per loop for Rural Carriers ($4 to $1,585) is substantially greater than for non-Rural Carriers ($38 to $163).
d. Depreciation expenses and corporate operations expenses per loop tend to follow similar trends as for plant specific expenses in that they increase as the number of lines in the study area decreases.

Appendix B

Rural Task Force
Criteria for Analysis

The following criteria for evaluating proxy cost models provide a variety of methods for evaluating the applicability of proxy cost models for determining universal service support for Rural Carriers. Evaluation of these criteria will involve informed judgment; particularly in making determinations of whether there is "reasonable representation" or "reasonable comparability", standards that may have varying interpretations depending on the criteria under consideration. While the models should be evaluated in regard to each of the criteria, judgement will need to be exercised in determining the "sufficiency" of meeting the individual criteria and the overall balance of "sufficiently" meeting the criteria in total.

I. Model Structure

1. The model structure should be evaluated in relationship to the ten criteria established by the FCC in its Report and Order in CC Docket No. 96-45 (FCC 97-157) released May 8, 1997, paragraph 250.

> "1. The technology assumed in the cost study or model must be the least-cost, most-efficient, and reasonable technology for providing the supported services that is currently being deployed. A model, however, must include the ILECs' wire centers as the center of the loop network and the outside plant should terminate at ILEC's current wire centers. The loop design incorporated into a forward-looking economic cost study or model should not impede the provision of advanced service. Wire center line counts should equal actual ILEC wire center line counts, and the study's or model's average loop length should reflect the incumbent carrier's actual average loop length.
>
> "2. Any network function or element, such as loop, switching, transport, or signaling, necessary to produce supported services must have an associated cost.
>
> "3. Only long-run forward-looking economic cost may be included. The long-run period used must be a period long enough that all costs may be treated as variable and avoidable. The costs must not be the embedded cost of the facilities, functions, or elements. The study or model, however, must be based upon an examination of the current cost of purchasing facilities and equipment, such as switches and digital loop carriers (rather than list prices.)
>
> "4. The rate of return must be either the authorized federal rate of return on interstate services, currently 11.25 percent, or the state's prescribed rate of return for intrastate services....

"5. Economic lives and future net salvage percentages used in calculating depreciation expense must be within the FCC-authorized range....

"6. The cost study or model must estimate the cost of providing service for all business and households within a geographic region. This includes the provision of multi-line business services, special access, private lines, and multiple residential lines....

"7. A reasonable allocation of joint and common costs must be assigned to the cost of supported services. This allocation will ensure that the forward-looking economic cost does not include an unreasonable share of the joint and common costs for non-supported services.

"8. The cost study or model and all underlying data, formulae, computations, and software associated with the model must be available to all interested parties for review and comment. All underlying data should be verifiable, engineering assumptions reasonable, and outputs plausible.

"9. The cost study or model must include the capability to examine and modify the critical assumptions and engineering principles. These assumptions and principles include, but are not limited to, the cost of capital, depreciation rates, fill factors, input costs, overhead adjustments, retail costs, structure sharing percentages, fiber-copper cross-over points, and terrain factors.

"10. The cost study or model must deaverage support calculations to the wire center serving areas level at least, and, if feasible, to even smaller areas such as a Census Block Group, Census Block, or grid cell...."

2. The network "built" by the model reasonably represents a network that would be built in the real world by a telecommunications company to provide the same service levels and technology as assumed in the model.

a. At a wire center level the physical location of the network that is built is reasonably within the confines of the actual wire center boundaries.

b. At a wire center level the route mileage of plant built by the model is reasonably sufficient to serve the customer locations.

c. Cluster locations for digital loop carriers are appropriately located so that the 18,000 foot maximum copper loop length is not exceeded using rights-of-way that are actually available.

d. At the wire center level, calculated access line counts for residence and business customers are consistent with actual wire center access line counts, assuming that such wire center access line counts can be obtained.

e. The type of outside plant built by the model (e.g. aerial, buried, or underground) is reasonably consistent with the type of plant actually being used in new construction in the study area.

3. There is consistency between the model structure and its use of inputs and the basis upon which the model inputs were developed.

a. Assignment of specific network components to the model's density zones for cost development is consistent with the method used in developing the cost and other assumptions that vary based on those density zones.

II. Model Inputs

1. There is sufficient variability in model inputs to reflect cost differences reflected by forward-looking efficient rural companies with varying circumstances such as, geographic differences, cost of labor, purchasing power, geographic isolation, company size, etc.

a. Cost of cable reflects cost of cable purchased in both contract and work order quantities by companies with varying purchase discount capabilities and varying transportation cost requirements.

b. Cost of other purchased items reflect variations in cost encountered because of transportation costs, geographic location, and varying purchase discount capabilities.

c. Assumptions regarding the type of outside plant (e.g. aerial, buried, or underground) reflect the type of construction that is reasonably expected to be built in the location being modeled. Factors affecting the type of outside plant such as weather and geography will be reasonably reflected in plant construction type assumptions. Statutory and regulatory requirements affecting the type of outside plant will also be reflected unless specific policy determinations preclude giving these requirements consideration.

d. Structure sharing inputs will be reasonably consistent with construction methods that would be used for new construction of communications facilities in the specific area. When structure sharing is assumed, cost inputs for structures will reflect the cost of building structures that are consistent with sharing assumptions.

e. Expense inputs for such items as customer and corporate operations expenses will recognize the impact that company size has on these expenditures.

III. Model Outputs

Comparisons of model outputs to actual company data must be made with some care and specificity since network design features may differ from those in actual service and company functions modeled for universal service do not encompass the full range of functions actually performed in an operating company. Cost differences resulting from the historic age of actual plant also must be recognized in making such comparisons and in making judgments on the "reasonable comparability" of such information. Comparison of model results between companies are reasonably consistent with general expectations of relationships of costs for various cost components to such factors as density, size of the geographic area served, size of wire centers, and number of lines served.

1. Investment results produced by the model should be reasonably comparable to actual investment amounts in companies where the network elements in service are similar in technology and age to the network elements being modeled.

a. Outside plant investment results should be reasonably comparable to actual investment amounts in those companies or wire centers where the outside plant architecture has unloaded loops and digital loop carrier architecture with recent construction periods.

b. Central office switching investment results should be reasonably comparable to actual investment amounts in those companies that have digital switches with SS7 capabilities.

c. General support investment results (vehicles, general purpose computers, land, buildings, work equipment, furniture, etc.) should be reasonably comparable to actual investment amounts, giving consideration to cost differences due to age and operational differences.

2. Expense results produced by the model should be reasonably comparable to actual expense amounts for similar functions being conducted by the company, or by a similarly situated company or companies, to those that are being modeled.

a. Modeled plant specific expense results should have reasonably similar relationships to modeled plant investment results as do existing plant specific expense and investment amounts.

b. Modeled customer operations expense results should be reasonably comparable to actual customer operations expense amounts for the functions being modeled.

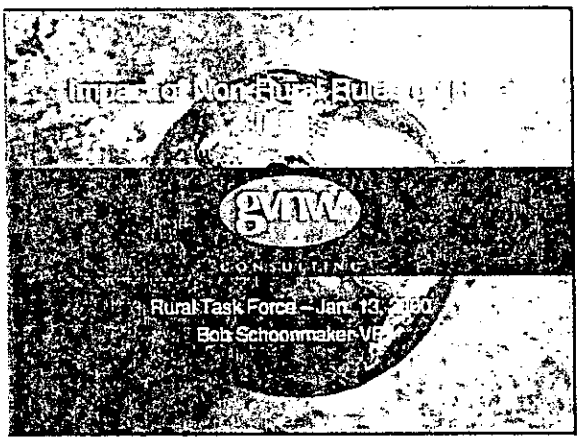
c. Modeled corporate operations expense results should be reasonably comparable to actual corporate operations expense amounts for the functions being modeled.

IV. Model Results

1. Comparison of model results between companies are reasonably consistent with general expectations of relationships of costs for various cost components to such factors as density, size of the geographic area served, size of wire centers, and number of lines served.

Appendix C

This appendix is the presentation delivered by Bob Schoonmaker of GVNW Consulting, Inc. during the January, 2000 Task Force meeting in Washington, D.C. entitled "*Impact of Non-Rural Rules on Rural ILECS*". Copies of this presentation are available on the RTF Website (www.wutc.wa.gov/rtf) in files named WP4-Appendix-C.ppt or WP4-Appendix-C.pdf



Purpose of Analysis

- Assume that inputs to model and methodology adopted for non-rural companies was applied to both rural and non-rural ILECs
- Analyze impacts on both rural and non-rural ILECs
- Identify concerns with non-rural methodology if applied to rural companies as well

Data sources for Analysis

- Non-rural ILECs
  - Data supplied by USTA based on data for non-rurals received from FCC staff
- Rural ILECs
  - Data supplied by AT&T based on AT&T runs of SYN model for rural study areas
- Data from both sources was transmitted as SYN output file for each company/study area
- Total data - 9 CD's, over 4 gigabytes

Known Data "anomalies"

- Neither rural or non-rural data included LNP costs as data inputs - FCC did adopt LNP cost
- Non-rural data contained Gallatin River, IL study area which is a rural company
- Rural data not included for:
  - Alaska study areas (24)
  - Guam
  - Virgin Islands
  - Micronesia
  - Numerous "mismatches" between model study areas and USAC study areas (over 50)

Unknown Data Issues

- NECA letter to FCC of December 23, 1999
  - NECA calculated non-rural high cost support of $391 million vs. FCC calculated $437 million
  - Appears to be program error using incorrect "default" value of special access lines
- Verification of individual rural study area information
- FCC issued public notice January, 2000 correcting model and non-rural results.

Known Impact of Data Anomalies

- Impact on non-rural only calculations of
  - No LNP cost in non-rural data
  - Gallatin River, IL in non-rural data
- National USF cost per month
  - FCC - $23.84
  - GVNW - $23.52
- Annual Support non-rural only (model only)
  - FCC - $252.1 million
  - GVNW - $262.5 million

Analysis Results - National Loop Cost

- National Loop Cost - Non-Rural Only
  Non-Rural $23.52
- National Loop Cost - Combined Rural and Non-Rural
  - Combined $26.09
  - Non-Rural Companies - $23.52
  - Rural Companies - $59.36

Analysis Results - # of States

- # of States receiving support - Non-Rural Only
  - Currently - 20
  - Non-Rural Only - 7
- # of States receiving support - Combined Rural and Non-Rural
  - Currently - 52
  - Non-Rural Companies - 15
  - Rural Companies - 15

Analysis of Results - USF Support
(excluding Hold Harmless)

- Non-Rural Companies Only
  - Current Support - $207.4 million
  - FCC Method Support - $262.5 million
- Combined Non-Rural and Rural Companies
  - All Companies
    - Current Support - $1,760.7 million
    - FCC Method Support - $692.0 million
    - Change $(1,068.7) million

Analysis of Results - USF Support
(excluding Hold Harmless)

- Combined Non-Rural and Rural Companies
  - Non-Rural Companies
    - Current Support - $207.4 million
    - FCC Method Support - $241.1 million
    - Change - $33.7 million
  - Rural Companies
    - Current Support - $1,553.3 million
    - FCC Method Support - $450.9 million
    - Change -$(1,068.7) million

Analysis of Results - USF Support
(excluding Hold Harmless)

- Impact on Non-Rural Companies-FCC Method
  - Support with Non-Rural Only - $262.5 million
  - Support with Combined companies - $241.1 million
  - Change - $(21.4) million

Alternative Values - Lower Support Level

Support Level	Total Support	# of States
135%	$692.0 million	16
125%	$1,070.2 million	17
120%	$1,382.2 million	21
115%	$1,847.5 million	24

Alternative - Study Area Support Higher Support Level

Support Level	Total Support	# of States
135%	$3,382.3 million	44
150%	$2,787.4 million	43
175%	$2,140.9 million	43
200%	$1,728.3 million	42

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Summary

- Application of FCC methods and model inputs to rural companies has major negative impacts
- Single biggest impact is likely the decision to base support on statewide average cost rather than study area average cost
- Personal opinion - Use of FCC methods and model inputs for rural companies does not provide sufficient, predictable support for those companies

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Appendix D

This appendix contains two schedules that provide state specific data of the impacts of applying the non-Rural Carrier federal universal service method to both Rural Carriers and non-Rural Carriers. The schedules were part of the January 13, 2000 presentation by Bob Schoonmaker of GVNW Consulting, Inc. to the Task Force that is included in Appendix C. Copies of the schedules are available on the RTF Website (www.wutc.wa.gov/rtf) in a file named WP4-Appendix-D.xls.

Comparison of Lines and Monthly Cost
Preliminary Analysis of Application of Non-Rural USF Rules & Methods
To Both Non-Rural and Rural Companies

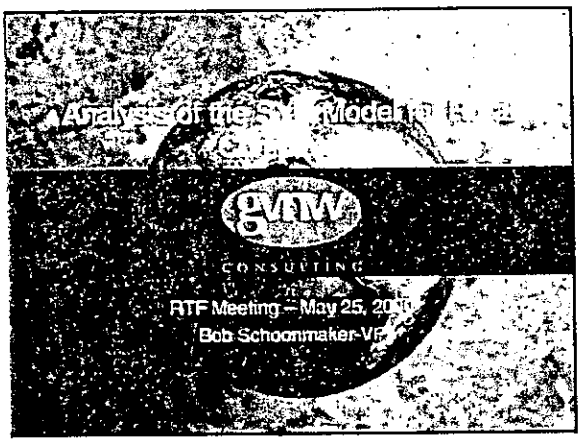
		Switched Lines				Monthly Per Line Cost		
STATE	ABBREV	Rural	Non-Rural	Total	% Rural	Rural	Non-Rural	Total
Alabama	AL	194,658	2,159,703	2,354,361	8.3%	$ 60.42	$ 35.26	$ 37.34
Alaska	AK	-	155,426	155,426	0.0%	$ -	$ 22.40	$ 22.40
Arizona	AZ	153,499	2,719,294	2,872,793	5.3%	$ 71.35	$ 20.62	$ 23.33
Arkansas	AR	395,776	960,914	1,356,690	29.2%	$ 68.04	$ 27.63	$ 39.42
California	CA	198,208	22,285,909	22,484,117	0.9%	$ 58.61	$ 19.76	$ 20.10
Colorado	CO	108,475	2,651,630	2,760,105	3.9%	$ 102.27	$ 22.56	$ 25.69
Connecticut	CT	20,168	2,284,859	2,305,027	0.9%	$ 32.70	$ 23.90	$ 23.98
Washington DC	DC	-	980,551	980,551	0.0%	$ -	$ 16.20	$ 16.20
Delaware	DE	-	559,794	559,794	0.0%	$ -	$ 22.11	$ 22.11
Florida	FL	139,521	9,477,138	9,616,659	1.5%	$ 58.19	$ 23.07	$ 23.58
Georgia	GA	699,295	4,033,311	4,732,606	14.8%	$ 51.47	$ 25.83	$ 29.62
Hawaii	HI	-	716,211	716,211	0.0%	$ -	$ 21.41	$ 21.41
Idaho	ID	204,404	528,261	732,665	27.9%	$ 63.47	$ 26.46	$ 36.78
Illinois	IL	424,000	7,859,474	8,283,474	5.1%	$ 43.61	$ 21.73	$ 22.85
Indiana	IN	367,546	3,109,293	3,476,839	10.6%	$ 51.40	$ 27.26	$ 29.81
Iowa	IA	508,018	1,113,218	1,621,236	31.3%	$ 66.67	$ 23.39	$ 36.95
Kansas	KS	243,075	1,351,910	1,594,985	15.2%	$ 87.83	$ 24.08	$ 33.80
Kentucky	KY	253,521	1,800,011	2,053,532	12.3%	$ 65.77	$ 32.92	$ 36.98
Louisiana	LA	163,381	2,286,640	2,450,021	6.7%	$ 61.73	$ 28.77	$ 30.97
Maine	ME	112,239	668,153	780,392	14.4%	$ 76.17	$ 32.98	$ 39.19
Maryland	MD	5,971	3,688,106	3,694,077	0.2%	$ 38.07	$ 20.92	$ 20.95
Massachusetts	MA	3,760	4,411,630	4,415,390	0.1%	$ 40.39	$ 19.23	$ 19.24
Michigan	MI	243,014	5,945,887	6,188,901	3.9%	$ 64.71	$ 25.83	$ 27.36
Minnesota	MN	554,999	2,402,305	2,957,304	18.8%	$ 60.29	$ 24.58	$ 31.28
Mississippi	MS	78,251	1,247,558	1,325,809	5.9%	$ 84.95	$ 41.81	$ 44.36
Missouri	MO	439,048	2,858,071	3,297,119	13.3%	$ 63.55	$ 27.71	$ 32.48
Montana	MT	142,826	362,570	505,396	28.3%	$ 130.59	$ 31.55	$ 59.54
Nebraska	NE	141,605	808,955	950,560	14.9%	$ 99.58	$ 28.25	$ 38.88
Nevada	NV	80,681	1,178,639	1,259,320	6.4%	$ 65.68	$ 20.52	$ 23.42
New Hampshire	NH	45,509	769,880	815,389	5.6%	$ 50.36	$ 26.49	$ 27.82
New Jersey	NJ	190,396	6,348,573	6,538,969	2.9%	$ 27.30	$ 19.30	$ 19.54
New Mexico	NM	122,101	787,901	910,002	13.4%	$ 100.49	$ 25.42	$ 35.49
New York	NY	650,065	11,334,782	11,984,847	5.4%	$ 44.87	$ 18.81	$ 20.23
North Carolina	NC	465,502	4,157,795	4,623,297	10.1%	$ 43.51	$ 29.77	$ 31.15
North Dakota	ND	142,512	253,381	395,893	36.0%	$ 113.39	$ 25.91	$ 57.40
Ohio	OH	464,846	6,204,775	6,669,621	7.0%	$ 36.69	$ 26.34	$ 27.07
Oklahoma	OK	209,554	1,733,722	1,943,276	10.8%	$ 89.48	$ 26.07	$ 32.91
Oregon	OR	235,622	1,852,964	2,088,586	11.3%	$ 70.14	$ 23.10	$ 28.40
Pennsylvania	PA	1,187,743	6,837,008	8,024,751	14.8%	$ 40.35	$ 22.02	$ 24.73
Puerto Rico	PR	-	1,087,749	1,087,749	0.0%	$ -	$ 27.57	$ 27.57
Rhone Island	RI	-	648,885	648,885	0.0%	$ -	$ 20.89	$ 20.89
South Carolina	SC	523,364	1,612,233	2,135,597	24.5%	$ 42.79	$ 29.15	$ 32.49
South Dakota	SD	132,209	275,570	407,779	32.4%	$ 114.87	$ 26.88	$ 55.41
Tennessee	TN	363,824	2,865,589	3,229,413	11.3%	$ 53.76	$ 29.57	$ 32.29
Texas	TX	582,651	11,477,745	12,060,396	4.8%	$ 69.20	$ 23.20	$ 25.42
Utah	UT	45,411	1,094,308	1,139,719	4.0%	$ 118.35	$ 20.44	$ 24.34
Vermont	VT	52,206	315,612	367,818	14.2%	$ 62.67	$ 36.12	$ 39.89
Virginia	VA	131,146	4,472,486	4,603,632	2.8%	$ 52.89	$ 24.89	$ 25.69
Washington	WA	385,747	3,280,515	3,666,262	10.5%	$ 52.77	$ 21.38	$ 24.69
West Virginia	WV	104,364	813,899	918,263	11.4%	$ 79.12	$ 36.60	$ 41.43
Wisconsin	WI	570,398	2,604,627	3,175,025	18.0%	$ 55.41	$ 26.24	$ 31.48
Wyoming	WY	26,657	241,197	267,854	10.0%	$ 126.75	$ 33.25	$ 42.55
TOTALS		12,507,766	161,676,617	174,184,383	7.2%	$ 59.36	$ 23.52	$ 26.09

Comparison of USF Support (without Hold Harmless)
Preliminary Analysis of Application of Non-Rural USF Rules & Methods
To Both Non-Rural and Rural Companies
(Analysis has known anomalies)

STATE	ABBREV	Current Support			Non-Rural Only		Non-Rural Method Support			Combined Rural and Non-Rural Companies			Change from Non-Rural Only
										Change from Current			
		Rural	Non-Rural	Total	Support	Change	Rural	Non-Rural	Total	Rural	Non-Rural	Total	
Alabama	AL	25,923,616	11,351,472	$ 37,280,088	$ 69,270,661	$ 57,919,189	$ 13,759,911	$ 31,809,928	$ 45,569,839	$ (12,168,705)	$ 20,458,456	$ 8,289,751	$ (37,460,734)
Alaska	AK	71,752,572	-	71,752,572	-	-	-	-	-	(71,752,572)	-	(71,752,572)	-
Arizona	AZ	32,936,700	-	32,936,700	-	-	-	-	-	(32,936,700)	-	(32,936,700)	-
Arkansas	AR	66,980,904	3,196,404	70,177,308	-	(3,196,404)	42,744,508	9,198,450	51,942,958	(24,236,396)	6,002,046	(18,234,350)	9,198,450
California	CA	42,712,836	6,372,420	49,085,256	-	(6,372,420)	-	-	-	(42,712,836)	(6,372,420)	(49,085,256)	-
Colorado	CO	42,881,688	2,391,912	45,273,600	-	(2,391,912)	-	-	-	(42,881,688)	(2,391,912)	(45,273,600)	-
Connecticut	CT	885,756	-	885,756	-	-	-	-	-	(885,756)	-	(885,756)	-
Washington DC	DC	-	-	-	-	-	-	-	-	-	-	-	-
Deleware	DE	-	-	-	-	-	-	-	-	-	-	-	-
Florida	FL	19,902,132	-	19,902,132	-	-	-	-	-	(19,902,132)	-	(19,902,132)	-
Georgia	GA	72,532,272	-	72,532,272	-	-	-	-	-	(72,532,272)	-	(72,532,272)	-
Guam	GU	2,182,152	-	2,182,152	-	-	-	-	-	(2,182,152)	-	(2,182,152)	-
Hawaii	HI	675,216	-	675,216	-	-	-	-	-	(675,216)	-	(675,216)	-
Idaho	ID	27,603,744	1,139,916	28,743,660	-	(1,139,916)	8,646,359	1,800,761	10,447,119	(18,957,385)	660,845	(18,296,541)	1,800,761
Illinois	IL	24,887,472	-	24,887,472	-	-	-	-	-	(24,887,472)	-	(24,887,472)	-
Indiana	IN	18,093,792	-	18,093,792	-	-	-	-	-	(18,093,792)	-	(18,093,792)	-
Iowa	IA	27,100,956	-	27,100,956	-	-	23,838,849	1,779,510	25,618,359	(3,262,107)	1,779,510	(1,482,597)	1,779,510
Kansas	KS	63,376,188	-	63,376,188	-	-	-	-	-	(63,376,188)	-	(63,376,188)	-
Kentucky	KY	17,607,936	1,878,936	19,486,872	19,295,971	17,417,035	15,048,883	17,840,718	32,889,601	(2,559,053)	15,961,782	13,402,729	(1,455,254)
Louisiana	LA	68,144,736	-	68,144,736	-	-	-	-	-	(68,144,736)	-	(68,144,736)	-
Maine	ME	18,998,820	-	18,998,820	7,498,213	7,498,213	15,748,195	12,490,757	28,238,952	(3,250,625)	12,490,757	9,240,132	4,992,544
Maryland	MD	552,276	-	552,276	-	-	-	-	-	(552,276)	-	(552,276)	-
Massachusetts	MA	582,120	-	582,120	-	-	-	-	-	(582,120)	-	(582,120)	-
Michigan	MI	40,507,596	1,423,020	41,930,616	-	(1,423,020)	-	-	-	(40,507,596)	(1,423,020)	(41,930,616)	-
Minnesota	MN	44,679,804	-	44,679,804	-	-	-	-	-	(44,679,804)	-	(44,679,804)	-
Mississippi	MS	22,762,116	6,882,264	29,644,380	114,492,193	107,609,929	25,473,513	84,976,625	110,450,138	2,711,397	78,094,361	80,805,758	(29,515,568)
Missouri	MO	48,167,628	9,070,692	57,238,320	-	(9,070,692)	-	-	-	(48,167,628)	(9,070,692)	(57,238,320)	-
Micronesia	MR	3,219,408	-	3,219,408	-	-	-	-	-	(3,219,408)	-	(3,219,408)	-
Montana	MT	44,643,012	1,177,128	45,820,140	-	(1,177,128)	97,017,975	15,085,639	112,103,614	52,374,963	13,908,511	66,283,474	15,085,639
Nebraska	NE	21,918,012	-	21,918,012	-	-	22,794,998	8,914,489	31,709,486	876,986	8,914,489	9,791,474	8,914,489
Nevada	NV	11,553,864	-	11,553,864	-	-	-	-	-	(11,553,864)	-	(11,553,864)	-
New Hampshire	NH	8,047,764	-	8,047,764	-	-	-	-	-	(8,047,764)	-	(8,047,764)	-
New Jersey	NJ	970,056	-	970,056	-	-	-	-	-	(970,056)	-	(970,056)	-
New Mexico	NM	31,329,984	3,800,136	35,130,120	-	(3,800,136)	1,914,119	346,392	2,260,512	(29,415,865)	(3,453,744)	(32,869,608)	346,392
New York	NY	40,314,168	-	40,314,168	-	-	-	-	-	(40,314,168)	-	(40,314,168)	-
North Carolina	NC	24,930,372	5,618,724	30,549,096	-	(5,618,724)	-	-	-	(24,930,372)	(5,618,724)	(30,549,096)	-
North Dakota	ND	25,335,516	-	25,335,516	-	-	74,103,647	5,983,726	80,087,373	48,768,131	5,983,726	54,751,857	5,983,726
Ohio	OH	15,341,928	-	15,341,928	-	-	-	-	-	(15,341,928)	-	(15,341,928)	-
Oklahoma	OK	61,920,168	428,604	62,348,772	-	(428,604)	-	-	-	(61,920,168)	(428,604)	(62,348,772)	-
Oregon	OR	38,727,096	-	38,727,096	-	-	-	-	-	(38,727,096)	-	(38,727,096)	-
Pennsylvania	PA	22,369,536	-	22,369,536	-	-	-	-	-	(22,369,536)	-	(22,369,536)	-
Puerto Rico	PR	-	137,108,028	137,108,028	-	(137,108,028)	-	-	-	-	(137,108,028)	(137,108,028)	-
Rhone Island	RI	-	-	-	-	-	-	-	-	-	-	-	-
South Carolina	SC	38,301,960	4,992,276	43,294,236	-	(4,992,276)	-	-	-	(38,301,960)	(4,992,276)	(43,294,236)	-
South Dakota	SD	20,879,352	-	20,879,352	-	-	68,889,730	6,194,097	75,083,827	48,010,378	6,194,097	54,204,475	6,194,097
Tennessee	TN	29,966,208	-	29,966,208	-	-	-	-	-	(29,966,208)	-	(29,966,208)	-
Texas	TX	114,722,928	1,896,744	116,619,672	-	(1,896,744)	-	-	-	(114,722,928)	(1,896,744)	(116,619,672)	-
Utah	UT	10,730,436	-	10,730,436	-	-	-	-	-	(10,730,436)	-	(10,730,436)	-
Vermont	VT	10,946,592	571,236	11,517,828	12,591,852	12,020,616	5,866,167	9,791,869	15,658,036	(5,080,425)	9,220,633	4,140,208	(2,799,983)
Virginia	VA	24,261,252	-	24,261,252	-	-	-	-	-	(24,261,252)	-	(24,261,252)	-
Virgin Islands	VI	10,415,484	969,156	11,384,640	-	(969,156)	-	-	-	(10,415,484)	(969,156)	(11,384,640)	-
Washington	WA	43,335,360	-	43,335,360	-	-	-	-	-	(43,335,360)	-	(43,335,360)	-
West Virginia	WV	22,360,164	1,455,276	23,815,440	36,028,822	34,573,546	22,876,824	29,150,403	52,027,226	516,660	27,695,127	28,211,786	(6,878,419)
Wisconsin	WI	52,915,416	-	52,915,416	-	-	-	-	-	(52,915,416)	-	(52,915,416)	-
Wyoming	WY	21,440,244	5,649,528	27,089,772	3,295,698	(2,353,830)	12,214,317	5,691,625	17,905,942	(9,225,927)	42,097	(9,183,830)	2,395,927
TOTALS		$ 1,553,332,308	$ 207,373,872	$ 1,760,706,180	$ 262,473,411	$ 55,099,539	$450,937,993	$ 241,054,990	$ 691,992,983	$ (1,102,394,315)	$ 33,681,118	$ (1,068,713,197)	$ (21,418,421)

Appendix E

This appendix is the 145 slide PowerPoint presentation delivered by Bob Schoonmaker of GVNW Consulting, Inc. at the May 25, 2000 meeting of the Task Force in Anchorage, Alaska, titled "Analysis of the SYN Model for Rural Companies". Copies of this presentation are available on the RTF Website (www.wutc.wa.gov/rtf) in files named WP4-Appendix-E.ppt or WP4-Appendix-E.pdf



Overview

- Preliminary Information
  - Description of analysis that has been done
  - General review of criteria
- Detailed review of criteria and analysis which has been done
- My personal observations on conclusions or judgments that result from the analysis

2

Overview of Criteria

- Model structure
  - Comparison to FCC initial model criteria
  - Realistic network modeled
  - Consistency between structure and inputs
- Model inputs
  - Sufficient variability to reflect individual company circumstances
- Model outputs
  - Reasonable comparability to actual results, where appropriate
- Model results
  - Test of reasonableness

3

Types of Analysis Done

- Sample Company analysis
  - 23 companies
  - Geographic Diversity
  - Size diversity
- Comparison to actual for several groups
  - 35 Missouri companies
  - 35 Illinois companies
  - 17 Oregon companies
  - 17 Utah/Idaho companies
  - 91 TDS companies
  - 13 Companies over 20,000 lines*

*Over 20,000 lines grouped together to provide a sufficient sample size to look at larger companies. No intention to suggest a specific dividing line. Group includes 4 companies between 20-50,000, 6 companies between 50 – 100,000 and 3 companies over 100,000 lines.

4

Sample Companies - Geography

- Geographic Diversity
  - New England - 1
  - Other Northeast – 3
  - Southeast - 3
  - Upper Midwest - 4
  - Lower Midwest - 2
  - Mountain - 3
  - Southwest - 4
  - Northwest - 2
  - Alaska - 1
  - Insular – 1 (sort of)(New England company)
  - Total - 23

5

Sample Companies – Size Diversity

- Size of Companies (Access Lines)
  - Under 500 – 2
  - 500 – 2,000 – 4
  - 2,001 – 5,000 – 7
  - 5,001 – 10,000 – 4
  - 10,001 – 50,000 – 4
  - Over 50,000 - 2

6

RTF Model Criteria

- Adopted by the RTF in November, 1999
- Has provided direction for the type and scope of analysis that has been completed
- "Evaluation of these criteria will involve informed judgment, particularly in making determinations of whether there is "reasonable representation" or "reasonable comparability", standards that may have varying interpretations depending on the criteria under consideration. While the models should be evaluated in regard to each of the criteria, judgment will need to be exercised in determining the "sufficiency" of meeting the individual criteria and the overall balance of "sufficiently" meeting the criteria in total."

7

Model Limitations-Area Coverage

- Alaska –
  - Underlying data for Alaska companies appears to be in model databases
  - Model tables which are used to run the model contain only Anchorage Telephone Co.
  - Currently unable to run the model for other Alaska companies
  - All Alaska companies show Anchorage as tandem switch location
  - Transport calculations running model as currently configured would likely be extremely high

    Model doesn't reflect current satellite technology interoffice transport typically used in Alaska

8

Model Limitations-Area Coverage

- Virgin Islands, Guam, Micronesia, Palau, American Samoa (Insular areas)
  - No data in model to run these areas
  - Extensive data gathering required including:
    - Exchange boundaries
    - Tandem locations
    - Soil, water depth and other geographic data
    - Data equivalent to census data
    - Road data for geocoding surrogate
  - At the present time there is no way to use the model for insular areas

9

Model Limitations – Study Areas

- Comparison of model results in January, 2000 to USAC data resulted in over 60 unmatched study areas between the two lists
  - If model is to be used, these lists must be reconciled
  - Administrative procedures need to be established to update model on a regular basis as study areas change

10

RTF Structure Criteria #1 – FCC Model Criteria

- Structure Criteria #1 – Model should be evaluated in relationship to FCC criteria established in May 8, 1997 FCC Order in CC Docket 96-45

11

FCC Model Criteria - #1

- 1. Least cost, most efficient network.
  - Use current wire center locations.
  - Loop design doesn't impede advanced services.
  - Wire center line counts match actual line counts.
  - Average loop length from model reflects actual average loop length.
- Observations
  - Uses current wire center locations
  - Least cost, most efficient network
  - Doesn't impede advanced services

    Loop length assumption not tested

12

FCC Model Criteria #1 (Wire Center Line Counts)

% Difference Model to Actual	# of Wire Centers	% of WC
>+50% greater	12	5.0%
+25% to +50% greater	16	6.6%
+10% to +25% greater	29	12.0%
0% to +10% greater	20	8.3%
0% to -10% less	25	10.3%
-10% to -25% less	50	20.7%
-25% to -50% less	70	28.9%
<-50% less	20	8.3%
TOTAL	242	100.0%

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FCC Model Criteria #1 (Wire Center Line Counts)

- Model method to adjust wire line counts
- Observation
  - Substantial variations in wire center line counts at present time
  - Overall impact is understatement of lines
  - May be able to gather data on an annual basis to update wire line counts but would require extensive administrative effort

14

FCC Model Criteria #2 – All functions have a cost

- Criteria #2 requires that all network elements have a cost associated with them
- Observation
  - No LNP cost in any sample companies
  - No other observation of non-compliance with this criteria

15

FCC Model Criteria #3 – Forward Looking Cost

- Criteria #3 calls for model costs to be forward looking costs and to not include embedded costs of companies
- Observations
  - Model cost structures and inputs are generally considered to be forward looking

16

FCC Model Criteria #4 & 5 – Rate of Return & Depreciation

- Criteria #4 – Rate of return must be FCC authorized 11.25%
- Criteria #5 – Depreciation rates must fall within current FCC guidelines
- Observations
  - These criteria are being met in the model.

17

FCC Model Criteria #6 – All services within the region

- Criteria #6 – Model must estimate costs for all services including residential, business, second lines, special access, etc.
- Observations
  - Model parameters are set to attempt to estimate costs for all these services
    No specific tests conducted to evaluate this criteria beyond access lines comparisons by wire center
  - Sample companies include no single-line business lines (unsure why this is the case)

18

FCC Model Criteria #7 – Joint and Common Costs

- Criteria #7 – A reasonable allocation of joint and common costs must be allocated to supported services.
- Observations
  - Evaluation of network support expense and customer and corporate operations expense inputs presented hereafter may be relevant to this criteria

19

FCC Model Criteria #8 – Ability to examine

- Criteria #8 – Underlying formulae, computations, etc. readily available for review. Underlying data verifiable and output plausible.
- Observations
  - No attempt made to review loop logic. Wide number of comments related to difficulty in reviewing this section of the model
  - Documentation of model is limited and not well organized. Some critical information for running model is in "History" document, not operating manual, for example.

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FCC Model Criteria #8 – Ability to examine

- Observations (cont.)
  - User interface for choosing companies is confusing
  - Model integration between FCC loop model and HAI modules is confusing:
    - USOA output for network, corporate, and customer operations expense is incorrect
    - Structure sharing assumptions displayed in HAI output modules don't reflect actual model use
    - Cost of UNE elements developed by model are incorrect since all "corporate overhead" expense is included in NID cost element
    - Several expense related inputs appear to be hard coded in output results. (Corporate overhead, expense/investment relationships)

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FCC Model Criteria #8 – Ability to examine

- Observations (cont.)
  - Output plausibility will be examined further in the criteria review process

22

FCC Model Criteria #9 – Critical assumptions

- Must include capability to examine and modify critical assumptions and engineering principles
- Observations
  - Model assumptions are generally via separate inputs
  - See observations under #8 – ability to examine these assumptions is hampered some by the model structure

23

FCC Model Criteria #10 – Level of support calculation

- Must deaverage support calculation at least to the wire center level and preferably to smaller areas
- Observations
  - Model does calculate support at wire center level
  - Some costs calculated at cluster level, but support levels are not

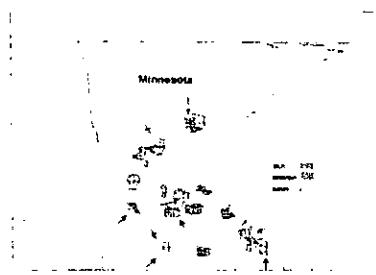
24

RTF Criteria Structure #2a – Network within wire center

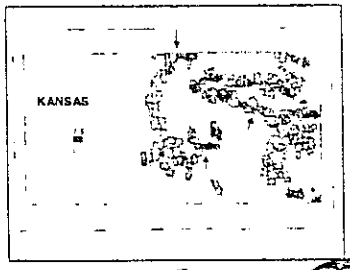
- Structure Criteria #2a – At the wire center level the model builds the network within actual exchange boundaries
- Map analysis by NECA –
  - Comparison of model and actual wire center boundaries
  - Comparison of network to model wire center boundaries
  - Comparison of CBG's to actual wire center boundaries
- Most of this analysis is not complete
  - Late start
  - Technical problems

25

Model to Actual Exchange Boundaries

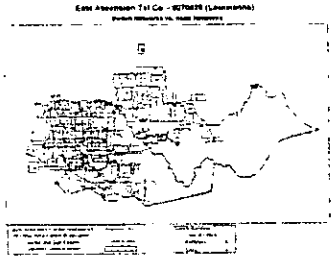


Model to Actual Exchange Boundaries



27

RTF Criteria Structure #2a – Network to Wire Center-example



28

RTF Criteria Structure #2a – Network within wire center

- Observations
  - Provider of original electronic maps for model use is no longer in business and maps cannot be obtained
  - Analysis incomplete at this point in time

29

RTF Criteria Structure #2b – Route Mileage

- Criteria #2b – Route mileage is reasonably sufficient to serve customers in the wire center
- Analysis completed
  - Sample companies – requested route mileage of plant by wire center
  - Model output – feeder and distribution plant footage
  - Discrepancy inherent in study information – actual mileage likely to include interoffice facilities

30

RTF Criteria Structure #2b – Route Mileage

% Model to Actual Route Miles	# of Wire Centers	% of Wire Centers
>200% greater	28	12.1%
+100% to +200% greater	35	15.2%
+50% to +100% greater	32	13.9%
+25% to +50% greater	33	14.3%
0% to 25% greater	30	13.0%
0% to -25% less	43	18.6%
-25% less to -50% less	18	7.8%
-50% or less	12	5.2%
TOTAL	231	100.0%

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RTF Criteria Structure #2b – Route Mileage

- Observations
  - Model generated route miles generally greater than actual miles
  - Substantial differences between route miles in a large portion of the wire centers
  - No attempt made to review model calculation of distances. Uncertain whether the comparison is valid. Also may be variances in the way the actual data is counted.
  - Largest difference – model - 1,032 miles, actual - 87 miles

    Unsure what conclusions, if any, to draw from this analysis

32

RTF Criteria Structure #2c – Cluster locations

- Criteria #2c – Cluster locations in model appropriate so that 18,000 foot maximum is not violated using available rights-of-way
- Analysis performed
  - Sub-group of sample company wire centers that have DLC deployed
  - Comparison of cluster counts between actual and model
  - Analysis presented in C&WF output section

33

RTF Criteria Structure #2d – Access Line Counts

- Criteria #2d – Access line counts for residence and business customers by wire center will be consistent with actual
- Analysis performed
  - Comparison of model and actual total lines
  - Residential lines/household
  - Comparison of % Residence lines to total lines model vs. actual

34

RTF Criteria Structure #2d – Access Line Counts

% Difference Model to Actual	# of Wire Centers	% of WC
>+50% greater	12	5.0%
+25% to +50% greater	16	6.6%
+10% to +25% greater	29	12.0%
0% to +10% greater	20	8.3%
0% to -10% less	25	10.3%
-10% to -25% less	50	20.7%
-25% to -50% less	70	28.9%
<-50% less	20	8.3%
TOTAL	242	100.0%

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RTF Criteria Structure #2d – Model Res. Lines/HH

# of Lines/Household	# of Wire Centers	% of Wire Centers
= 1.0	84	30.7%
>1.0 to 1.05	146	53.3%
>1.05 to 1.10	43	15.7%
>1.10 to 1.20	1	0.4%
>1.2	-	0.0%
Total	274	100.0%

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RTF Criteria Structure #2d – Diff. in % of Res. Lines-Model to Actual

Model % Res lines to Act. % Res. lines	# of Wire Centers	% of Wire Centers
less than -10%	-	0.0%
-10% to 0%	48	19.7%
0% to +10%	57	23.4%
+10% to +20%	74	30.3%
greater than +20%	65	26.6%
Total	244	100.0%

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RTF Criteria Structure #2d – Access Line Counts

- Comments on specific results
  - Model produces no single-line business lines for sample companies (uncertain what impact this has on cost)
  - One sample company with several wire centers had no business lines from the model
- Observations
  - Model results differ from actual, substantially in many cases
  - Lines/household reflect very few second residence lines
  - % of residence lines to total reflect substantial variations between model and actual

36

RTF Criteria Structure #2e – Outside plant type

- Criteria #2e - The type of plant constructed by the model is reasonably consistent with the type of plant being used in new construction
- Analysis conducted
  - Comparisons of overall plant type constructed
    - **Sample companies**
    - **Large groups**
- Possible inconsistency with criteria
  - Data analyzed reflects construction over time, not new construction only

39

RTF Structure Criteria #2e – Outside Plant Type – Buried %

Group	Actual	SYN Model	High Act.	Low Act.
IL Co.	91.5%	60.8%	100.0%	72.6%
MO Co.	91.4%	51.5%	100.0%	0.0%
UT/ID Co.	93.6%	53.6%	100.0%	21.1%
OR Co.	88.8%	59.4%	99.5%	74.5%
TDS Co.	76.4%	64.1%	100.0%	4.3%
Sam. Co.	93.1%	51.6%	100.0%	39.0%
Large Co.	83.3%	64.2%	95.8%	45.8%

40

RTF Structure Criteria #2e – Outside Plant Type – Aerial %

Group	Actual	SYN Model	High Act	Low Act.
IL Co.	4.3%	26.1%	20.12%	0.0%
MO Co.	7.6%	24.8%	80.9%	0.0%
UT/ID Co.	3.9%	23.4%	65.1%	0.0%
OR Co.	4.7%	23.2%	9.4%	0.0%
TDS Co.	21.5%	24.6%	98.8%	0.0%
Sam. Co.	5.8%	26.4%	78.0%	0.0%
Large Co.	13.7%	23.9%	100.0%	1.6%

41

RTF Structure Criteria #2e – Outside Plant Type – Underg. %

Group	Actual	SYN Model	High Act.	Low Act.
IL Co.	4.2%	14.8%	20.9%	0.0%
MO Co.	0.9%	15.8%	71.7%	0.0%
UT/ID Co.	2.6%	23.0%	57.8%	0.0%
OR Co.	6.5%	17.4%	19.4%	0.0%
TDS Co.	2.1%	11.3%	18.4%	0.0%
Sam. Co.	1.1%	18.1%	9.4%	0.0%
Large Co.	2.9%	13.9%	13.7%	0.4%

42

RTF Criteria Structure #2e – Outside plant type

- Observations
  - Wide degree of variation in individual companies
  - Model builds substantially greater percentage of aerial plant than is actually deployed
  - Model builds substantially smaller percentage of buried plant than is actually deployed
  - Model builds substantially greater percentage of underground plant than is actually deployed
  - Single set of inputs nationally by density zone does not reflect the geographic diversity actually experienced

43

RTF Criteria Structure #3a – Density Zone Consistency

- Criteria #3a – Assignment of areas to density zones are consistent with cost development associated with zones
- Background
  - Major models have nine density zones
  - Numerous inputs based on density
  - Cost inputs related to density to reflect construction conditions typical to the type of area. Initially built on census block analysis.
  - HAI and BCPM calculate density on a census block basis
    SYN calculates density on the inside area of a cluster
  - In SYN single line clusters are assigned to density zone 4 (200-650 lines/sq. mile)

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RTF Criteria Structure #3a – Density Zone – Sample Companies

Zone (lines/sq. mile)	Lines	% of Total
0 - 5	32,089	13.5%
5 - 100	94,879	40.1%
100 - 200	29,385	12.4%
200 - 650	57,365	24.2%
650 - 850	10,709	4.5%
850 - 2,550	12,419	5.2%
2,550 - 5,000	0	0.0%
5,000 - 10,000	0	0.0%
> 10,000	0	0.0%
Total	236,846	100.0%

45

RTF Criteria Structure #3a – Density Zone Consistency

- Analysis completed
  - Comparison of density results between HAI and SYN models
    - Results shown for five companies from the sample companies

    Comparison of model to actual
    - Model data calculated at the cluster level and summed to the wire center level
    - Actual data received from sample companies at the wire center level

46

RTF Criteria Structure #3a – DZ Comparison – Company A

Zone	HAI Lines	SYN Lines	% HAI	% SYN
0 - 5	19	39	2.0%	4.8%
5 - 100	107	768	11.4%	95.2%
100 - 200	815	-	86.7%	0.0%
200 - 650	-	-	0.0%	0.0%
650 - 850	-	-	0.0%	0.0%
850 - 2,550	-	-	0.0%	0.0%
2,550 - 5,000	-	-	0.0%	0.0%
5,000 - 10,000	-	-	0.0%	0.0%
> 10,000	-	-	0.0%	0.0%
Total	940	807	100.0%	100.0%

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RTF Criteria Structure #3a – DZ Comparison – Company B

Zone	HAI Lines	SYN Lines	% HAI	% SYN
0 - 5	2,698	836	95.9%	36.3%
5 - 100	115	1,429	4.1%	62.1%
100 - 200	-	-	0.0%	0.0%
200 - 650	-	37	0.0%	1.6%
650 - 850	-	-	0.0%	0.0%
850 - 2,550	-	-	0.0%	0.0%
2,550 - 5,000	-	-	0.0%	0.0%
5,000 - 10,000	-	-	0.0%	0.0%
> 10,000	-	-	0.0%	0.0%
Total	2,813	2,302	100.0%	100.0%

Note: All 37 lines in 47 zone are from single line clusters

RTF Criteria Structure #3a – DZ Comparison – Company C

Zone	HAI Lines	SYN Lines	% HAI	% SYN
0 - 5	86	229	2.2%	5.8%
5 - 100	2,178	792	55.2%	20.2%
100 - 200	-	-	0.0%	0.0%
200 - 650	401	2,909	10.2%	74.0%
650 - 850	-	-	0.0%	0.0%
850 - 2,550	1,277	-	32.4%	0.0%
2,550 - 5,000	-	-	0.0%	0.0%
5,000 - 10,000	-	-	0.0%	0.0%
> 10,000	-	-	0.0%	0.0%
Total	3,943	3,930	100.0%	100.0%

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RTF Criteria Structure #3a – DZ Comparison – Company D

Zone	HAI Lines	SYN Lines	% HAI	% SYN
0 - 5	2,830	1,536	50.2%	27.1%
5 - 100	383	1,418	6.8%	25.0%
100 - 200	-	248	0.0%	4.4%
200 - 650	-	2,469	0.0%	43.5%
650 - 850	-	-	0.0%	0.0%
850 - 2,550	2,425	-	43.0%	0.0%
2,550 - 5,000	-	-	0.0%	0.0%
5,000 - 10,000	-	-	0.0%	0.0%
> 10,000	-	-	0.0%	0.0%
Total	5,637	5,671	100.0%	100.0%

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RTF Criteria Structure #3a – DZ Comparison – Company E

Zone	HAI Lines	SYN Lines	% HAI	% SYN
0 - 5	4,833	2,958	34.5%	23.1%
5 - 100	7,323	4,977	52.3%	38.9%
100 - 200	1,638	649	13.1%	5.1%
200 - 650	-	1,722	0.0%	13.4%
650 - 850	-	1,513	0.0%	11.8%
850 - 2,550	-	987	0.0%	7.7%
2,550 - 5,000	-	-	0.0%	0.0%
5,000 - 10,000	-	-	0.0%	0.0%
> 10,000	-	-	0.0%	0.0%
Total	13,993	12,806	100.0%	100.0%

51

RTF Criteria Structure #3a – Comparison of wire center areas

- Analysis included nine sample companies and 81 wire centers
- Overall Results – Sq. Miles
  - Model – 6,736
  - Actual – 57,830
- Overall Results – Access Lines
  - Model – 41,037
  - Actual – 44,128
- Overall Results – Density
  - Model – 6.1 lines/sq. mile
  - Actual – 0.8 lines/sq. mile

52

RTF Criteria Structure #3a – Comparison of wire center areas

% Dif Mod. to Act Area	# of Wire Cent.	% of Wire Cent.
less than -90%	29	35.8%
-75% to -90%	25	30.9%
-50% to -75%	21	25.9%
-25% to -50%	3	3.7%
0 to -25%	0	0.0%
0 to +25%	1	1.2%
+25% to +50%	0	0.0%
+50% to +75%	0	0.0%
+75% to +90%	1	1.2%
greater than +90%	1	1.2%
Total	81	100.0%

53

RTF Criteria Structure #3a – Density Zone Consistency

Observations

- HAI and SYN model results are substantially different in density zone assignments
- SYN model "ignores" substantial portion of the company operating area in calculating density
- Overall impact is for model to identify higher density than actual overall operating area
- Assignment of single line clusters to zone 4 is not appropriate

54

RTF Input Criteria #1a – Cost of Cable

- Input Criteria #1a – Cost of cable reflects cable purchases in both contract and work order quantities and variation in quantity discounts and transportation costs
- Background
  - FCC inputs for non-rural companies based on study of RUS contract costs only
  - Costs adjusted for engineering, splicing, and volume discounts
  - National input values

55

RTF Input Criteria #1a – Cost of Cable-Copper

Cable Type	Non-Rural Input	Without volume discount
25 pair bur.-24 ga.	$0.91/ft.	$0.95/ft.
100 pair bur.-24 ga.	$1.65/ft.	$1.82/ft.
400 pair bur.-24 ga.	$4.60/ft.	$5.30/ft.
25 pair art.-24 ga.	$1.53/ft.	$1.57/ft.
100 pair art.-24 ga.	$2.21/ft.	$2.37/ft.
400 pair art.-24 ga.	$1.53/ft.	$1.57/ft.

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RTF Input Criteria #1a – Cost of Cable-Fiber

Cable Type	Non-Rural Input	Without volume discount
12 fiber bur.	$0.98/ft.	$1.11/ft.
24 fiber bur.	$1.32/ft.	$1.58/ft.
48 fiber bur.	$2.01/ft.	$2.54/ft.
12 fiber aer.	$1.24/ft.	$1.25/ft.
24 fiber aer.	$1.79/ft.	$2.09/ft.
48 fiber aer.	$2.37/ft.	$2.97/ft.

57

RTF Input Criteria #1a – Cost of Cable

- Sample company comparisons
  - Attempted to gather data
  - Limited responses, questions regarding what specific costs are included
  - No basis for comparison

58

RTF Input Criteria #1a – Cost of Cable

- Observations
  - Rural companies generally unable to get volume discounts received by non-rural companies (input level should be different from non-rural)
  - Single rate does not recognize transportation and installation variations by region
  - Non-rural data based on 1997 RUS data – cost changes over time

59

RTF Input Criteria #1b – Cost of Other purchased items

- Criteria #1b – Cost of other purchased items reflect differences in transportation cost, geography, and purchase discounts
- Attempted to gather data on four items
  - No usable responses

60

RTF Input Criteria #3c
Type of Plant Constructed

- Criteria #3c – Assumptions reflect type of plant construction for area being modeled. Weather and geography reasonably reflected in assumptions.
- Background
  - Model input for type of plant primarily based on assumptions on plant mix per density band for feeder (both copper and fiber) and distribution
    Model includes some cost minimization alternatives
  - Type of plant does not vary based on geographic inputs except possibly in cost minimization formulas

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gvnw

RTF Input Criteria #3c
Distribution Plant Mix-Non-Rural

Density Zone	Underg. %	Buried %	Aerial %
0 – 5	0%	60%	40%
5 – 100	1%	62%	37%
100 – 200	2%	68%	30%
200 – 650	4%	66%	30%
650 – 800	8%	62%	30%
800 – 2,550	20%	50%	30%

62

gvnw

RTF Input Criteria #3c
Type of Plant Constructed

- Observations
  - Single set of inputs does not reflect differences in plant construction
  - As seen in Structure Criteria #2e model results and actual plant mix is widely divergent
  - Model doesn't reflect widely different circumstances of rural companies
  - Model inputs don't reflect RUS rules favoring buried plant

63

gvnw

RTF Input Criteria #3d –
Structure Sharing

- Input Criteria #3d – Reasonably consistent with construction methods for new construction in the area. Cost inputs for construction consistent with structure sharing assumptions.
- Background – Input %
  - Extent to which structures are shared with other utilities
  - Aerial – Poles and guys
  - Buried – Trench
  - Underground – Trench and conduit
  - Input % reflects % of cost assigned to telco cost

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RTF Input Criteria #3d
Density Zone Example

Density Zone (lines/sq. mile)	Lot Size at High end of Zone
0 – 5	128 acres
5 – 100	6.4 acres
100 – 200	3.2 acres
200 – 650	.98 acres
650 – 800	.75 acres
800 – 2,550	.25 acres

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gvnw

RTF Input Criteria #3d
Structure Sharing Input

Density Zone	Underg. %	Buried %	Aerial %
0 – 5	100%	100%	50%
5 – 100	100%	100%	50%
100 – 200	85%	85%	50%
200 – 650	65%	65%	50%
650 – 800	65%	65%	50%
800 – 2,550	65%	65%	50%

66

gvnw

RTF Input Criteria #3d
Structure Sharing

- Considerations
  - Do electric company and telephone company always share poles in very rural areas, i.e. Zones 1-2? Zone 3?
  - In Zone 3 (lots 6.4 to 3.2 acres) will telco share trench with electric or cable 30% of the time?
  - In Zone 4 (lots 3.2 to .98 acres) will telco share trench with electric or cable 70% of the time?
- Observations
  - Aerial sharing too low in zones 1-3
  - Buried sharing too low in zones 3-4, maybe higher

67

RTF Criteria #3d –
Structure Sharing - Cost

- Background
  - Cost of structure assumptions do not change based on structure sharing assumptions, but do change with density zones
  - Does the cost of the structure change if sharing occurs?
    - **Aerial – 40 ft. pole assumed in all cases**
    - **Buried – Sharing with electric utility requires deeper trench, trench vs. plowing, separation of utilities in trench**
    - **Underground – requires ducts for shared facilities – does model recognize and build sufficient ducts?**

66

RTF Criteria #3d –
Structure Sharing - Cost

- Observations
  - Structure sharing assumptions have significant impact on overall loop cost
  - Assumptions not consistent with my experience for rural companies
  - If model is used, structure sharing assumptions should be reviewed more thoroughly
  - If model is used, structure cost assumptions should be reviewed more thoroughly

69

RTF Input Criteria #3e
Customer and Corp. Oper. Exp.

- Input Criteria #3e – Inputs for customer and corporate operations should recognize impact company size has on these expenditures (I added network operations as well)
- Background
  - Network Operations Expense – Testing, Network Power, Engineering Planning, Dispatch & Trouble, General Operations Administration
  - Customer Operations Expense – Customer Contact, Marketing, Bill Rendering, Cash Collection, Carrier Billing (CABS), Carrier Customer Contact, Number services
  - Corporate Operations Expense – Executive, Human Resources, Legal, Accounting, Consulting, Corporate Planning, Regulatory

70

RTF Input Criteria #3e
Customer and Corp. Oper. Exp.

- Background (Cont.)
  - Non-rural inputs for these items input on an amount/line basis.
  - Non-rural inputs based on analysis of expenses plus regression analysis using lines and toll minutes of use
  - Relevant discussion issue regarding these items as to how much applies to universal service and how much to other corporate activities

71

RTF Input Criteria #3e
Customer and Corp. Oper. Exp.

- Observations
  - Single input per line for all company sizes will not likely reflect variations due to company size, differences in state regulation, etc.
  - Analysis of the impact of these inputs contained in output criteria discussion

72

Other Input Comments – Traffic Inputs

- SYN model traffic assumptions
  - Based on composite RBOC data per line
  - Assumes same per line traffic per jurisdiction for all rural ILECs
  - Input of 65% of total traffic as interoffice traffic. Leads to calculation that 46.69% of local traffic is interoffice for all rural ILECs.
  - Results in 68.21% of total traffic estimated as local traffic
  - Traffic assumptions have impact on End Office Usage, Transport, and Signaling cost

Other Input Comments – Traffic Inputs – Model to Actual

Sample Companies	Actual	Model	% Difference
Total DEM (000 omitted)	1,566,662	1,515,668	-3.25%
Tot. Local DEM (000 omitted)	1,023,260	1,064,054	+4.01%
Local Interoffice DEM (000 Omitted)	279,042	518,018	+85.67%

Other Input Comments – Traffic Inputs – Diff. By Company

% Diff – Model to Actual OEM	# Companies – Total DEM	# Companies – Local DEM	# Companies – Loc. Interoff.
Less -50%	1	1	0
-50% to -25%	3	3	1
-25% to 0%	4	4	7
0% to +25%	4	4	4
+25% to +50%	3	3	3
+50%	3	3	3

Other Input Comments – Traffic Inputs – Actual % of Traffic

% of Traffic	# of Companies - % of Local to Total DEM (Model 68.2%)	# of Companies - % of Local Interoffice to Total Local DEM (Mod 46.7%)
<30%	1	13
30% to 40%	0	1
40% to 50%	5	2
50% to 60%	5	1
60% to 70%	3	0
> 70%	4	1

Other Input Comments – Traffic Inputs

- Observations
  - Model traffic volume for sample companies as a whole are reasonably close except for local interoffice.
  - Variations on an individual company basis are substantial
  - While the model has the capability to accept individual company traffic inputs through individual ARMIS files, there would be substantial new administrative requirements to gather individual company data. Data for average schedule companies would not be available.

RTF Output Criteria - Comparison to Actual Result

- Cautions
  - Comparison of Model Results to actual must be reviewed carefully to address issue of forward-looking vs. embedded cost
  - Comparisons for individual items will have more or less relevance depending on the item
  - Individual judgments will have to be made on the relevance of the comparisons

RTF Output Criteria #1c – Gen. Sup. Inv. - Land

- Background – Model logic
  - Fixed $ amount per CO based on size
  - Percentage of plant in service
- Comparability
  - Land is a very long-lived asset. Land costs have risen substantially over time. Forward looking cost of land should generally be greater than actual.
  - May be question of whether actual land includes some amount of land unneeded on a forward looking basis

91

RTF Output Criteria # 1c Land - Model to Actual

($ 000s)

Group	Model Results	Actual	% Diff
Illinois Co.	1,022	1,942	-47.4%
Missouri Co.	1,713	1,718	-0.3%
UT/Idaho Co.	709	2,049	-65.4%
Oregon Co.	531	2,179	-75.6%
TDS Co.	3,491	4,594	-24.00%
Sample Co.	2,180	5,402	-59.7%
Large Co.	6,023	4,903	22.9%

92

RTF Output Criteria # 1c Land – Company Dist.

Group	< -25%	-25% to -10%	-10% to +10%	+10% to +25%	> +25%
IL Co.	15	2	1	1	13
MO Co.	14	2	0	1	30
UT/ID Co.	10	0	2	0	6
OR Co.	13	1	0	0	3
TDS Co.	34	9	5	8	35
Sam. Co.	13	4	1	0	4
Large Co.	3	2	1	1	6

93

RTF Output Criteria #1c – Gen. Sup. Inv. - Land

- Observations
  - Overall group comparisons shows estimated land investment significantly less than actual investment. This is inconsistent with the general direction of land cost.
  - Individual company results vary widely with most companies showing over 25% variation (plus or minus) between actual and model investment.

94

RTF Output Criteria #1c – Gen. Sup. Inv. - Buildings

- Background – Model logic
  - Percentage of plant in service
- Comparability
  - Buildings are very long-lived assets. Comparability will depend on building lives by company. In general building costs have risen substantially over time. Forward looking costs should therefore generally be greater than actual
  - Building inventories in actual use may be greater than forward looking need because of reductions in COE building requirements from mechanical to digital

95

RTF Output Criteria #1c Buildings - Model to Actual

($ 000s)

Group	Model Results	Actual	% Diff
Illinois Co.	21,205	24,515	-13.5%
Missouri Co.	48,249	22,655	113.0%
UT/Idaho Co.	21,529	23,957	-10.1%
Oregon Co	12,789	14,582	-12.3%
TDS Co.	70,233	59,174	18.7%
Sample Co.	67,958	62,721	8.4%
Large Co.	127,858	101,673	25.8%

96

RTF Output Criteria #1c Buildings – Company Dist.

Group	< -25%	-25% to -10%	-10% to +10%	+10% to +25%	> +25%
IL Co.	10	0	3	2	20
MO Co.	4	0	0	4	30
UT/ID Co.	7	3	0	3	6
OR Co.	6	0	1	2	8
TDS Co.	19	9	16	4	42
Sam. Co.	8	2	3	0	9
Large Co.	2	2	2	1	6

97

RTF Output Criteria #1c – Gen. Sup. Inv. - Buildings

- Observations
  - Group results vary widely with estimates of building costs both higher than and lower than actual for various groups of companies.
  - Individual company results show wide variations from actual with large numbers of companies varying by 25% or greater (both higher and lower).

98

RTF Output Criteria #1c – Vehicles

- Background – Model logic
  - Percentage of plant in service
- Comparability
  - Vehicles are a short to medium length asset. Cost of vehicles has generally increased over time. Forward-looking costs might be somewhat greater than actual.
  - Vehicle needs in companies vary based on density, terrain, company size, etc.

99

RTF Output Criteria #1c Vehicles - Model to Actual

($ 000s)

Group	Model Results	Actual	% Diff
Illinois Co.	3,843	8,394	-54.2
Missouri Co.	7,843	9,737	-19.5
Ut/Idaho Co.	3,794	7,766	-51.2
Oregon Co.	2,249	5,594	-59.8
TDS Co.	14,081	22,454	-37.3
Sample Co.	15,525	19,593	-20.8
Large Co.	30,973	37,258	-16.9

100

RTF Output Criteria #1c Vehicles – Company Dist.

Group	< -25%	-25% to -10%	-10% to +10%	+10% to +25%	> +25%
IL Co.	20	1	1	0	8
MO Co.	18	1	8	2	6
UT/ID Co.	13	0	1	0	2
OR Co.	13	1	0	0	3
TDS Co.	57	6	8	7	12
Sam. Co.	10	3	4	1	3
Large Co.	7	1	2	1	2

101

RTF Output Criteria #1c – Vehicles

- Observations
  - Overall results show vehicle investments significantly lower than actual for all groups of companies.
  - Although company results show variations from actual both high and low, a substantial majority reflect model results more than 25% lower than actual.
  - Would appear that model understates vehicle costs overall with significant individual company variances.

102

RTF Output Criteria #1c – Gen. Sup. Inv. – Tools & Work Eq.

- Background – Model logic
  - Percentage of plant in service
- Comparability
  - Category includes trenchers, trailers, backhoes, snowmobiles, drills, boring equipment, etc.
  - Equipment life is medium length. Cost of equipment over time has probably increased in general. Forward looking should be more than actual
  - Small company investment in this category varies widely. Some use contractors and have little inventory.

103

RTF Output Criteria #1c Tools & Work Eq. - Model to Actual

($ 000s)

Group	Model Results	Actual	% Diff
Illinois Co.	3,157	7,363	-57.1
Missouri Co.	6,566	8,896	-26.2
Utl/Idaho Co.	3,295	6,866	-52.0
Oregon Co.	1,635	3,714	-56.0
TDS Co.	11,340	15,114	-25.0
Sample Co.	12,560	13,071	-3.9
Large Co.	22,491	24,819	-9.4

104

RTF Output Criteria #1c Tools & Work Eq. – Company Dist.

Group	< -25%	-25% to -10%	-10% to +10%	+10% to +25%	> +25%
IL Co.	19	0	2	1	9
MO Co.	17	1	4	1	12
UT/ID Co.	13	1	0	0	4
OR Co.	9	1	0	1	3
TDS Co.	47	8	14	7	13
Sam. Co.	11	2	1	1	7
Large Co.	5	1	3	0	4

105

RTF Output Criteria #1c – Gen. Sup. Inv. – Tools & Work Eq.

- Observations
  - Wide variation in individual company model estimates and actual investments.
  - Model estimates tend to show lower investments than actual for most groups. For many of them the differences are substantial.

106

RTF Output Criteria #1c Gen. Sup. Inv. – Furn. & Off. Eq.

- Background – Model logic
  - Percentage of total plant in service
- Comparability
  - This category includes relatively long-lived assets such as furniture, and relatively short-lived assets such as copy machines, fax machines, etc.
  - Variability in actual results from age of equipment and from whether functions are performed in-house or contracted out (billing, for example)

107

RTF Output Criteria #1c Furn. & Off. Eq. - Model to Actual

($ 000s)

Group	Model Results	Actual	% Diff
Illinois Co.	5,484	4,292	27.8
Missouri Co.	11,261	4,341	159.4
Utl/Idaho Co.	5,862	2,004	192.5
Oregon Co.	2,963	2,332	27.0
TDS Co.	18,994	8,042	136.2
Sample Co.	20,777	7,979	160.4
Large Co.	33,095	15,502	113.5

108

RTF Output Criteria #1c
Furn. & Off. Eq. – Company Dist.

Group	< -25%	-25% to -10%	-10% to +10%	+10% to +25%	> +25%
IL Co.	10	0	1	4	18
MO Co.	1	2	2	2	31
UT/ID Co.	0	0	0	2	17
OR Co.	6	0	1	2	7
TDS Co.	2	0	7	3	77
Sam. Co.	3	1	3	0	14
Large Co.	2	0	1	1	9

109

RTF Output Criteria #1c
Gen. Sup. Inv. – Furn. & Off. Eq.

- Observations
  - Individual company results vary widely from model results with a substantial majority of the companies having actual investments more than 25% different than model estimates (both higher and lower).
  - Overall group results indicates that the model significantly overestimates furniture and office equipment investments of rural companies.

110

RTF Output Criteria #1c
Tot. Gen. Sup. - Model to Actual

($ 000s)

Group	Model Results	Actual	% Diff
Illinois Co.	41,656	51,138	-18.5
Missouri Co.	88,299	53,308	65.6
UtIdaho Co.	40,414	44,499	-9.2
Oregon Co.	23,784	32,930	-27.8
TDS Co.	139,710	176,481	-21.7
Sample Co.	140,785	119,041	18.3
Large Co.	254,966	205,666	24.0

111

RTF Output Criteria #1c
Tot. Gen. Sup. – Company Dist.

Group	< -25%	-25% to -10%	-10% to +10%	+10% to +25%	> +25%
IL Co.	13	2	2	4	14
MO Co.	5	0	5	4	23
UT/ID Co.	9	1	3	3	2
OR Co.	8	4	0	0	5
TDS Co.	46	15	11	5	14
Sam. Co.	8	2	2	4	5
Large Co.	3	1	2	3	4

112

RTF Output Criteria #1c –
General Support Investment

- Observations
  - Category is a smaller part of the total company cost than C&WF and COE switching
  - Model method does not reflect individual company differences in operations
  - Model method generates widely varying results in comparison to actual
  - For longer lived assets the model may not reflect forward-looking cost

113

RTF Criteria #2a –
Plant Specific Expenses

- Output Criteria #2a – Relationship between model expense and investment and actual expense and investment should be reasonably similar
- Comparability
  - Different C&WF design with more fiber might lead to different expense/investment relationship for C&WF and for COE transmission
  - Since COE switching investment is same design as model, comparability should be closer for this item

114

RTF Output Criteria #2a
COE Switch Exp. Ratio

Group	Model Results	Actual	
Illinois Co.	5.57	7.78	
Missouri Co.	5.77	8.52	
Ut/Idaho Co.	5.59	6.17	
Oregon Co.	5.57	2.07	
TDS Co.	5.58	2.77	
Sample Co.	5.58	6.42	
Large Co.	5.58	4.80	

115

RTF Output Criteria #2a
COE Transmission Exp. Ratio

Group	Model Results	Actual	
Illinois Co.	1.94	8.25	
Missouri Co.	1.93	1.93	
Ut/Idaho Co.	2.18	2.46	
Oregon Co.	2.07	4.66	
TDS Co.	2.03	2.83	
Sample Co.	2.08	2.20	
Large Co.	2.06	2.50	

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RTF Output Criteria #2a
C&WF Exp. Ratio

Group	Model Results	Actual	
Illinois Co.	3.36	4.77	
Missouri Co.	3.25	3.26	
Ut/Idaho Co.	2.39	4.37	
Oregon Co.	3.00	3.20	
TDS Co.	3.55	2.89	
Sample Co.	2.62	3.24	
Large Co.	3.15	4.26	

117

RTF Criteria #2a –
Plant Specific Expenses

- Observations
  - COE switching ratios to investment differ between various groups. Model estimates are both higher and lower than group actual results.
  - COE transmission ratios vary somewhat between groups but are reasonably close to model estimates
  - C&WF ratios of expense to investment do not vary significantly with groups
  - Review of individual company data shows wider variations than shown in the slides

118

RTF Criteria #2b –
Customer Operations Expense

- Criteria #2b – Model results reasonably comparable to actual cost for functions being modeled
- Comparability
  - Actual results (in total) include costs for functions that are not being modeled such as carrier billing, marketing, and toll billing costs.
  - Analysis of actual needs to be adjusted for these non-modeled items. Preliminary analysis of actual based on separations data suggests that model should be up to 60% below actual.

119

RTF Output Criteria #2b
Cust. Op. Exp. - Model to Actual
($ 000s)

Group	Model Results	Actual	% Diff
Illinois Co.	$4,677	$11,862	-60.6%
Missouri Co.	$7,188	$11,665	-38.4%
Ut/Idaho Co.	$2,165	$3,742	-42.1%
Oregon Co.	$2,730	$6,358	-57.1%
TDS Co.	$20,755	$63,654	-67.4%
Sample Co.	$10,739	$19,102	-43.8%
Large Co.	$42,037	$72,559	-42.1%

120

RTF Criteria #2b(sup) – Network Operations Expense

- Observations
  - Actual results for companies vary widely from each other and from model results
  - Model results are significantly below actual company results
  - Rural companies have smaller portion of network operations than non-rural related to non-supported functions
  - Model results not reflective of rural companies forward-looking costs in this component

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RTF Criteria #2c – Corporate Operations Expense

- Criteria #2c – Model results reasonably comparable to actual cost for functions being modeled
- Comparability
  - Actual results (in total) include costs for functions that are not being modeled (toll billing, carrier billing, non-basic services, directory, etc.)
  - Analysis of actual results needs to be adjusted for corporate operations related to non-USF items.

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RTF Output Criteria #2c Corp. Op. Exp. - Model to Actual

($ 000s)

Group	Model Results	Actual	% Diff
Illinois Co.	$2,647	$19,143	-86.2%
Missouri Co.	$4,069	$20,818	-80.5%
UT/Idaho Co.	$1,226	$12,295	-90.0%
Oregon Co.	$1,545	$11,125	-86.1%
TDS Co.	$11,751	$65,357	-82.0%
Sample Co.	$6,080	$28,361	-73.6%
Large Co.	$23,774	$75,829	-68.7%

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RTF Output Criteria #2c Corp. Op. Exp. – Company Dist.

Group	< -25%	-25% to -10%	-10% to +10%	+10% to +25%	> +25%
IL Co.	35	-	-	-	-
MO Co.	37	-	-	-	-
UT/ID Co.	16	-	-	-	-
OR Co.	17	-	-	-	-
TDS Co.	99	1	-	-	-
Sam. Co.	21	-	-	-	-
Large Co.	10	-	-	-	-

130

RTF Criteria #2c – Corporate Operations Expense

- Analysis Performed
  - Use of separations data
    - All corporate operations exp. assigned to local
    - All corporate op. exp. assigned to common line in access
    - Portion of corporate op. exp. supported by DEM weighting factor
- Results of Analysis
  - Analysis incomplete, didn't request all of needed data
  - Prelim. results indicate probable 60% to 70% of actual corporate operations is related to modeled elements.

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RTF Criteria #2c – Corporate Operations Expense

- Results of Analysis (cont.)
  - Individual company results will vary from below 50% to over 70% of the total
  - Individual company results on a per line basis will vary from less than $5 to greater than $20 per line per month.
  - Average sample company per line results for modeled functions will probably be in the range of $10 to $11 per month. Model input is $2.18 per month.
- Observations
  - Model input level is low for rural companies.
  - Single input per line per month for all companies does not reflect company variations due to size, cost structures, etc.

132

RTF Model Results Criteria

- Model results criteria – Results are reasonably consistent with relationships of costs to factors such as density, size of area, size of wire centers, and number of lines served.

133

RTF Model Results Criteria – Overall USF Cost – Sample Co's.

	Weighted Avg.	% of Total	High Company	Low Company
Loop	$97.05	85.5%	$246.82	$37.70
Port	2.72	2.4%	13.86	1.31
E.O. Usage	4.04	3.6%	20.59	1.95
Signaling	0.91	0.8%	6.14	0.09
Transport	8.77	7.7%	55.95	1.32
TOTAL	$113.48	100.0%	$281.10	$45.08

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RTF Model Results Criteria – Sample Co. - Overall

Co #	USF Cost	Density	Avg. Lines/WC	Total Lines
1	$ 281.10	0.42	435	11,305
2	$ 254.40	0.44	711	6,400
3	$ 251.83	0.67	520	3,118
4	$ 243.83	48.00	192	192
5	$ 178.23	1.00	2,670	16,022
6	$ 177.92	1.22	358	6,450
7	$ 173.66	0.50	264	4,745
8	$ 165.18	4.34	196	391

135

RTF Model Results Criteria – Sample Co. - Overall

Co #	USF Cost	Density	Lines/WC	Total Lines
9	$ 164.20	2.19	433	866
10	$ 146.22	3.29	462	6,471
11	$ 143.40	1.15	689	7,582
12	$ 132.35	23.30	157	629
13	$ 103.29	7.87	2,999	2,999
14	$ 96.11	15.05	1,204	3,611
15	$ 93.35	3.10	1,422	78,210
16	$ 87.03	2.60	1,544	81,842

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RTF Model Results Criteria – Sample Co. - Overall

Co #	USF Cost	Density	Lines/WC	Total Lines
17	$ 76.38	4.61	728	4,370
18	$ 67.19	22.12	1,298	3,893
19	$ 63.66	34.02	1,429	1,429
20	$ 62.02	8.12	999	999
21	$ 54.04	23.24	2,998	20,988
22	$ 45.08	23.25	1,376	4,127
23	$ -	1.17	685	5,269

137

RTF Model Results Criteria – Sample Co. - Loop

Co #	Loop Cost	Density	USF Cost	Total Lines
1	$ 246.82	0.42	$ 281.10	11,305
2	$ 228.14	0.44	$ 254.40	6,400
3	$ 215.24	0.67	$ 251.83	3,118
4	$ 169.29	48.00	$ 243.83	192
5	$ 149.03	1.00	$ 178.23	16,022
7	$ 146.45	0.50	$ 173.66	4,745
8	$ 137.14	1.22	$ 177.92	6,450
9	$ 132.14	2.19	$ 164.20	866

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RTF Model Results Criteria – Sample Co. - Loop

Co #	Loop Cost	Density	USF Cost	Total Lines
10	$ 127.00	3.29	$ 146.22	6,471
11	$ 121.90	1.15	$ 143.40	7,582
8	$ 118.31	4.34	$ 165.18	391
13	$ 94.64	7.87	$ 103.29	2,999
14	$ 86.63	15.05	$ 96.11	3,611
15	$ 77.97	3.10	$ 93.35	78,210
16	$ 76.42	2.60	$ 87.03	81,842
17	$ 62.87	4.61	$ 76.38	4,370

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RTF Model Results Criteria – Sample Co. - Loop

Co #	Loop Cost	Density	USF Cost	Total Lines
12	$ 61.26	23.30	$ 132.35	629
18	$ 57.59	22.12	$ 67.19	3,893
19	$ 54.85	34.02	$ 63.66	1,429
20	$ 53.55	8.12	$ 62.02	999
21	$ 49.36	23.24	$ 54.04	20,988
22	$ 37.70	23.25	$ 45.08	4,127
23	$ -	1.17	$ -	5,269

140

RTF Model Results Criteria – Sample Co. - Switch

Co #	Port & Use Cost	Avg. Lines/WC	Total Lines	Trans.& Sig. Cost
12	$ 34.44	157	629	$ 36.65
8	$ 28.06	196	391	$ 18.81
9	$ 17.49	433	866	$ 14.57
6	$ 17.29	358	6,450	$ 23.50
3	$ 14.86	520	3,118	$ 21.74
4	$ 12.45	192	192	$ 62.09
7	$ 11.99	264	4,745	$ 15.21
5	$ 11.31	2,670	16,022	$ 17.89

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RTF Model Results Criteria – Sample Co. - Switch

Co #	Port & Use Cost	Avg. Lines/WC	Total Lines	Trans.& Sig. Cost
1	$ 10.20	435	11,305	$ 24.08
14	$ 7.59	1,204	3,611	$ 1.89
17	$ 7.51	728	4,370	$ 6.01
18	$ 7.44	1,298	3,893	$ 2.16
10	$ 6.80	462	6,471	$ 12.42
11	$ 6.10	689	7,582	$ 15.40
2	$ 5.90	711	6,400	$ 20.36
19	$ 5.80	1,429	1,429	$ 3.00

142

RTF Model Results Criteria – Sample Co. - Switch

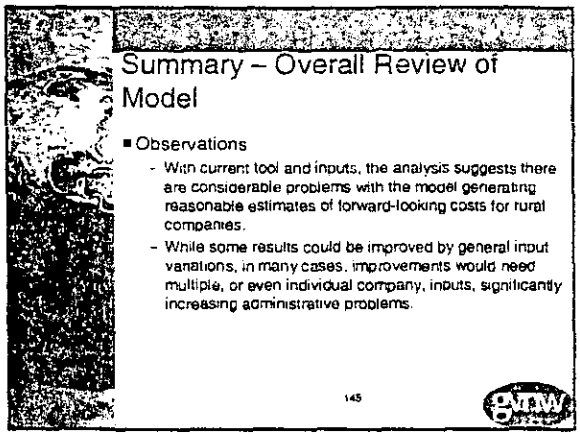
Co #	Port & Use Cost	Avg. Lines/WC	Total Lines	Trans.& Sig. Cost
20	$ 5.50	999	999	$ 2.97
15	$ 5.48	1,422	78,210	$ 9.90
16	$ 5.39	1,544	81,842	$ 5.22
13	$ 5.14	2,999	2,999	$ 3.52
22	$ 4.89	1,376	4,127	$ 2.49
21	$ 3.25	2,998	20,988	$ 1.42
23	$ -	585	5,269	$ -

143

RTF Model Results Criteria –

- Observations
  - Reasonable correlation between density and loop costs in many, but not all, cases
  - General correlation between lines/switch and port and usage costs in many, but not all, cases
  - Wide variation in costs for transport and signaling. In many cases this is a major contributor to cost.

144


Summary – Overall Review of Model
■ Observations
- With current tool and inputs, the analysis suggests there are considerable problems with the model generating reasonable estimates of forward-looking costs for rural companies.
- While some results could be improved by general input variations, in many cases, improvements would need multiple, or even individual company, inputs, significantly increasing administrative problems.
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SCHEDULE RCS-10

PROPRIETARY

SCHEDULE RCS-11

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