

1       **5. Zones Within Wire Centers**

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3       **Q.     Let’s turn to the fifth major section of your testimony. Has the Commission**  
4       **asked to see evidence concerning geographic deaveraging below the wire**  
5       **center?**

6       A.     Yes. Specifically, the Commission wants to see evidence concerning costs in two zones  
7       within each wire center:

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9                     Further, Commission Staff proposed that the costs within the  
10                    wire center be broken down to lines inside the base rate area  
11                    and those outside the base rate area. As Commission Staff  
12                    stated, the costs to provide service to those customers that are  
13                    outside the base rate area are greater due to the increased  
14                    costs to provision the loop. The Commission concludes that  
15                    evidence should be presented in the testimony scheduled  
16                    herein, breaking down costs within the wire center to the more  
17                    urban lines and the lines that are outside the base urban area to  
18                    the extent feasible for consideration. [Order 10, ¶ 57].

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20       **Q.     Can the extent of geographic deaveraging affect the payments from the KUSF?**

21       A.     Yes. The zone concept can have a very significant impact on the extent of support  
22       provided to specific customers, the amount of funding received by competitive carriers,  
23       and it could potentially even impact the overall size of the fund (depending upon how  
24       the concept is implemented). Cost estimates that are developed for large geographic  
25       areas will tend to reflect average conditions throughout that entire area. High cost areas  
26       will be offset by low cost areas. Taken to the extreme, costs can be developed for an  
27       entire state, or a large statewide “study area” (e.g. the SWBT service territory in  
28       Kansas). When this is done, cost conditions would be broadly averaged, and carriers

1           would receive the same amount of support per line, regardless of whether that line is  
2           located in downtown Wichita or in a high cost rural area.

3                       The FCC's decision to average costs within each statewide study area is the  
4           primary reason why Kansas is not receiving any support from the FCC's new cost-  
5           based USF mechanism for non-rural carriers. While SWBT serves some high cost  
6           areas, these are balanced by lower cost areas like Wichita, leading the FCC to  
7           conclude that SWBT's average costs are close to the national average.

8                       If the fund were separately calculated using the cost for individual wire centers,  
9           or relatively homogeneous groups of wire centers (such as the three geographic zones  
10          used in developing SWBT's unbundled element costs) it would isolate high cost  
11          conditions to a much greater degree. Even this approach, however, fails to disclose  
12          whether there are both low cost and high cost areas within individual wire centers. A  
13          finer-grain approach can further identify the specific areas that might need high-cost  
14          support, separating them from those areas which might not.

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16       **Q. Has the FCC completely rejected geographic deaveraging below the wire**  
17       **center?**

18       A. No. In a decision adopted on September 9, 1999 the FCC agreed with the  
19       Washington Commission's proposed service area designation, and granted the  
20       requested waiver to permit the disaggregation of federal high cost support currently  
21       given at the study area level. Specifically the Washington Commission's petition;

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23                       proposes to disaggregate federal high cost support currently  
24                       given at the study area level, by using the Benchmark Cost  
25                       Proxy Model (BCPM) to estimate the cost of providing service

1                   in density zones within each exchange served by the rural  
2                   carriers. [*Order No. DA 99-1844, September 9, 1999, ¶ 1*].  
3

4           **Q.     Can you be more specific as to how the “Washington Experiment” would be**  
5           **implemented?**

6           A.     Yes. The FCC goes on to explain that;

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8                   Under the methodology proposed by petitioners, the individual  
9                   exchanges of the rural LECs would first be designated as their  
10                  service areas. Then the federal high cost support that is  
11                  currently provided to the rural LEC petitioners on a study area  
12                  basis would be disaggregated and redistributed among the  
13                  smaller geographic service areas. ....This methodology would  
14                  be used to estimate the relative cost of providing service in a  
15                  lower-cost and a higher-cost density zone within each  
16                  exchange. This cost data would then be used to set the support  
17                  amount for carriers providing service within each of these  
18                  density zones.[*Order No. DA 99-1844, September 9, 1999, ¶*  
19                  4].  
20

21           **Q.     Are there advantages to this type of an approach, which distinguishes costs and**  
22           **fund payments below the wire center?**

23           A.     Yes. In the era of monopolistic telecommunications providers it was not necessary to  
24                  accurately identify high cost areas. Cost averaging within a wire center did not  
25                  adversely affect the provider, since it could spread the high costs to its other customers  
26                  without fear of losing the low cost customers to another provider. However, in this new  
27                  era of competition it will be increasingly necessary to accurately target the high cost  
28                  customers. Although the FCC has not implemented this approach on the national level,  
29                  it is clear it recognizes the potential benefits of a more disaggregated approach, as

1           evidenced by some of the language in its decision authorizing the “Washington  
2           Experiment”:

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4                       Specifically, if ...universal service support were not  
5                       geographically disaggregated, a competitor could receive a  
6                       windfall by providing service in a relatively low cost exchange  
7                       and receiving support based on the average cost within the  
8                       study area. Petitioners' proposal to disaggregate support is  
9                       designed to reduce such opportunities for cream skimming  
10                      [*Order No. DA 99-1844, September 9, 1999, ¶ 12*].  
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12       **Q.    One potential objection to deaverage costs is that the FCC model isn't**  
13       **designed for this, unlike BCPM. Has the FCC warned parties not to use its**  
14       **model to calculate costs below the wire center?**

15       A.    No. To the contrary, the FCC recommended using the FCC Model in the Washington  
16       Experiment, in order to get more accurate results:

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18                      ... we urge petitioners to consider substituting the synthesis  
19                      model in the proposed methodology when it is finalized. We  
20                      urge petitioners to take this course because regardless of the  
21                      Commission's ultimate decision on whether to apply the  
22                      synthesis model to rural carriers, we believe that the synthesis  
23                      model provides more accurate cost estimates than does the  
24                      BCPM and use of the synthesis model will make it easier for  
25                      USAC to administer petitioners' methodology. We hereby give  
26                      advance approval to modifications to petitioners' proposal to  
27                      conform the model platform and inputs to those adopted by this  
28                      Commission. [*Order No. DA 99-1844, September 9, 1999, ¶*  
29                      16].  
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1       **Q.     Dr. Johnson, can you summarize the rationale for distinguishing zones within**  
2       **the wire centers?**

3       A.     Yes. In many rural wire centers the customers in town are actually quite inexpensive to  
4       serve. The only reason these wire centers appear to have high costs is because  
5       customers outside of town are very costly to serve. If support is provided to all lines in  
6       these wire centers, CLECs will be encouraged to serve the wire center, but the support  
7       payments they receive won't necessarily relate to the extent to which they actually serve  
8       high cost customers. If a CLEC chose to install cable in town and resell the incumbent's  
9       services outside of town, it would not experience any high costs. Yet, it would  
10      potentially receive substantial payments from the KUSF as if it were a facilities-based  
11      provider in a high cost area.

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13      **Q.     It might be argued that it is too difficult to implement the zone concept now, and**  
14      **that this should be deferred for a few years. What is your response?**

15      A.     If the Commission wants to deaverage costs below the wire center, it would be  
16      preferable to do this from the very beginning—even if the initial effort is somewhat crude  
17      and approximate. The trend towards competition is just beginning to emerge.  
18      Particularly in the rural areas, the design of the KUSF will have a significant impact on  
19      CLEC investment and entry decisions. If there is great uncertainty concerning which  
20      specific areas will be declared high cost and supported by the KUSF, or concerning the  
21      extent of the funding that will be available to these areas, it will have a chilling effect on  
22      investment decisions by potential new entrants. One of the most fundamental issues  
23      facing a CLEC is trying to determine whether all customers in a rural wire center are  
24      considered to be “high cost” or just the ones located outside of town. The answer to  
25      this question will largely determine the relative profitability of various entry strategies

1           and business plans. If support is available for the entire wire center, entrants will be  
2           strongly encouraged to install facilities in town, while they will not have any incentive to  
3           install facilities in the lower density, higher cost areas outside of town.

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5           **Q. Are there any problems with distinguishing zones within wire centers?**

6           A. Yes. The FCC Model doesn't readily accommodate different cost zones within wire  
7           centers. It does provide detailed information concerning the characteristics of clusters  
8           within each wire center, and the clusters can be sorted into zones, thereby making it  
9           feasible to calculate costs for zones. However, these calculations must be performed  
10          outside of the FCC model itself.

11                       Another difficulty is that the KCC will need to establish a clear definition of  
12          which parts of the wire center are included in each zone, and there needs to be some  
13          effort to synchronize the definition used in administering the KUSF payments with the  
14          definition used in sorting clusters into zones and calculating zonal costs. SWBT and one  
15          of the Sprint companies (UTC of Kansas) have already established tariff definitions  
16          which distinguish between the more urban and more rural parts of various wire centers.  
17          Although the existing system is only used to apply higher charges to those customers  
18          located outside the base rate area (OBRA), it could also be used in targeting KUSF  
19          payments. These customers currently pay an additional rate per line to help the LEC  
20          recover the higher costs associated with the longer loop lengths and lower densities  
21          associated with these rural customers. The KUSF could potentially provide support for  
22          the customers outside the existing base rate area boundaries, and pay less support (or  
23          no support) to customers inside the base rate area.

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2 **Q. Will it be more costly to administer the KUSF using zones?**

3 A. Not necessarily. This depends upon the particular approach to zones that is chosen by  
4 the Commission. Under some approaches, it could be less costly to administer the  
5 zone concept, because the KUSF would be targeted at a smaller number of customers  
6 and/or carriers located in the truly high cost areas parts of the state.

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8 **Q. Have you developed a feasible approach for distinguishing high and low cost  
9 zones within wire centers for SWBT and Sprint?**

10 A. Yes. Although the FCC Model doesn't identify zones within wire centers, there is  
11 sufficient data available at the cluster level within model work files to make the  
12 necessary calculations outside of the model. I have grouped the clusters into two  
13 distinct zones; low cost clusters are grouped into one zone and the higher cost clusters  
14 are grouped into the other zone.

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17 **Q. What criteria did you use to differentiate the low and high cost clusters?**

18 A. The FCC Model provides a measure of net density (lines per square mile within the  
19 cluster). I used this as the primary criterion in identifying the high and low cost clusters.  
20 For example, Zone 1 includes all clusters with density above a specified threshold. The  
21 outer zone (Zone 2) includes the remaining clusters.

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**Q. What density criterion did you use?**

A. For SWBT, I concluded that a threshold of 26 lines per square mile works very well. With this density criterion, the number of lines placed in Zone 2 is approximately the same as the total number of OBRA lines served by SWBT. This density criterion provides a high correlation (0.8243) between the number of OBRA lines and the number of Zone 2 lines in each wire center.

If the same criterion were used for UTC of Kansas, the match to their existing OBRA boundaries is not as close. If the Commission wants to synchronize the KUSF calculations to the existing OBRA boundaries, a lower density criterion would be more appropriate. Using a threshold of 13, the total number of lines in Zone 2 approximates the number of OBRA lines served by UTC of Kansas, and a high correlation is achieved (0.7763). As a policy matter, the Commission needs to decide if it wants to align the KUSF system to the existing OBRA boundaries of one or both of these carriers, or if it would prefer using a uniform criteria which doesn't necessarily match the existing OBRA criterion used by these carriers. However, from an administrative standpoint, SWBT and Sprint have indicated that the OBRA identification is the only method currently within their systems which would allow the Commission to identify rural customers.

**Q. Do you have a map illustrating the current OBRA boundaries and how these relate to the density based criteria you used?**

A. Yes. Map 14 shows the Atwood wire center with the current OBRA boundaries delineated in blue. As one can see, there are 3 distinct base rate areas in the Atwood wire center. Customers in the town of Atwood, the small community of Ludell, and the

1 town of Herndon (indicated by the yellow dots) are not required to pay the OBRA rate  
2 additive. All of the other customers (indicated by green dots) are outside the base rate  
3 area and therefore pay higher rates. The current OBRA boundary for each of these 3  
4 communities are shown. The town of Herndon is actually a separate exchange served  
5 remotely by the Atwood switch.  
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7 **Q. What else does this map show with regard to the Atwood wire center?**

8 A. In addition to the OBRA boundaries, we have included our density based Zone 1 -  
9 Zone 2 distinction on the map delineated in green. As you can see, the density criterion  
10 matches two of the current OBRA boundaries quite closely. However, the community  
11 of Ludell is not identified as a Zone 1 area, because this cluster has approximately 25  
12 lines per square mile, which is slightly less than our statewide density criterion.  
13

14 **Q. Could the KUSF zones be precisely linked to the actual OBRA boundaries?**

15 A. Yes. With additional time and effort, the clusters can be sorted into zones based on the  
16 exact OBRA boundaries, based on the SAI locations generated by the FCC model.  
17 Using GIS software, we can identify whether each SAI is inside or outside the OBRA  
18 boundary, as set forth in the tariffs on file with the Commission. Thus, for example, the  
19 cluster of customers in Ludell could be included in Zone 1 if the Commission wanted to  
20 align the zone system with the existing tariff maps, even though Ludell would not qualify  
21 as Zone 1 based upon a purely density based criteria.  
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23 **Q. You have discussed so far how the FCC model clusters can be organized into**  
24 **two zones within each wire center. How can this information be used in**  
25 **calculating the costs of each zone?**

1       A.     The FCC model produces intermediate work files with certain investment, line,  
2             distance, and area information for each cluster. We transferred this data into a separate  
3             spreadsheet, which we used to calculate costs by zone. We provided copies of this  
4             spreadsheet to the other parties, so that they could also develop costs by zone.

5             The spreadsheet is straightforward, although a bit complicated. First, the  
6             spreadsheet requires the user to distinguish between costs which are the same per line  
7             and those which vary with investment. We used regression analysis for each study area  
8             to make this distinction, but other approaches could also be used. Second, the clusters  
9             are sorted into zones, and the investments related to distribution and customer premises  
10            for each cluster are accumulated for each zone within each wire center. Rather than rely  
11            upon the feeder investment amounts reported by the FCC model for each cluster, the  
12            spreadsheet takes the total feeder investment for each wire center and allocates this  
13            amount to the two zones based upon the square root of the area within each zone. This  
14            provides a more reliable and stable measure of the feeder investment attributable to  
15            each zone. The total of these investments represents the loop investment in each zone.  
16            These investments are then converted to a monthly cost per line for each zone using a  
17            weighted average annual cost factor. Next, the monthly switching, transport and other  
18            miscellaneous costs per line are added, resulting in a total monthly cost per line for each  
19            of the two zones. These costs can then be used to calculate whether, and to what  
20            extent, KUSF support should be provided.

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22       **Q.     Since the FCC model develops costs for each cluster, why haven't you simply**  
23             **used those results, rather than grouping the clusters into two zones within each**  
24             **wire center?**

1       A.     I believe the zone approach provides a much more accurate and reasonable approach.  
2             If every cluster were analyzed and funded separately, the impact of errors in the  
3             modeling process will have an exaggerated effect as the unit of geography shrinks, and  
4             it would result in an excessively large fund. This happens because the fund size is driven  
5             by differences between the benchmark and the calculated cost; with extremely small  
6             geographic areas, errors in the modeling process, cost allocation procedures, and other  
7             phenomena will cause the calculated costs to fluctuate above and below the  
8             benchmark. Since the fund size is determined by the magnitude of the discrepancies  
9             above the benchmark (without any offsetting reduction for discrepancies below the  
10            benchmark), these fluctuations drive up the size of the fund.

11                    In attempting to model costs accurately, it is generally desirable to gather more  
12                    detailed data, and to attempt to refine costs for relatively small geographic areas—which  
13                    is what the FCC model does with its clusters. However, this does not imply that the  
14                    fund itself should be administered at the same level of geographic detail, or that the cost  
15                    results for each cluster should be considered completely reliable. To the contrary, it is  
16                    preferable to use somewhat larger areas in administering the fund, relative to the size of  
17                    the areas used in developing the costs.

18                    If individual clusters were used to administer the fund, the impact of random  
19                    modeling error could be quite serious--providing funding to clusters which appear to  
20                    have high costs simply due to errors in the modeling process. The result of using  
21                    individual clusters as the basis for funding is to increase the total size of the fund and to  
22                    increase the impact of modeling errors.

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1       **Q.     Doesn't this same line of reasoning suggest that the Commission should reject**  
2       **the zone concept and administer the KUSF based upon wire centers?**

3       A.     No. The FCC model is strong enough to support the zone concept, if the Commission  
4       decides that this higher level of targeting is desirable from a policy perspective. While  
5       the individual cluster results are potentially subject to error, when these cluster results  
6       are rolled up into zones, errors in the calculations for individual clusters tend to cancel  
7       out.

8                 By grouping the clusters within each wire center into two zones, the  
9       Commission is provided with a much more detailed understanding of the cost  
10      characteristics within each wire center. Yet, this is accomplished with a highly  
11      manageable degree of granularity (merely doubling the amount of data that needs to be  
12      reported and analyzed).

13                The zone approach allows the Commission to examine the cost of serving low  
14      and high cost areas within each wire center, without becoming lost in a sea of detail  
15      (e.g., costs for individual clusters). I believe this approach, which disaggregates each  
16      wire center into no more than two zones, achieves the best compromise between the  
17      dangers of oversized areas (where significant cost differences disappear through  
18      averaging) and undersized areas (where the output is difficult to work with, and the  
19      results may be unreliable due to modeling error).

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Direct Testimony of Ben Johnson, Ph.D.

On Behalf of the Kansas Corporation Commission Staff, Docket No. 99-GIMT-326-GIT

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**Q. Is there more than one way the zone concept can be applied in developing fund**

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**the itself?**

1       A.     Yes. There are undoubtedly multiple different ways the KUSF could be developed  
2             using the zone concept. For simplicity, I will limit my response to a primary approach  
3             and one alternative.

4                     Under the primary option, the Commission would take the support amounts  
5             developed without regard to zones and distribute them based upon the zone cost  
6             information. This is similar to the “Washington Experiment” authorized by the FCC, in  
7             which federal support dollars (developed without regard to zones) are distributed based  
8             upon zone-specific cost information.

9                     Under the alternative approach, the zone data can be used to not only to  
10            distribute the fund, but also to determine the size of the fund. More specifically, the per  
11            line costs in each zone would be compared to the cost benchmark. Support would be  
12            given to all supportable lines in the zone to the extent the cost per line for that zone  
13            exceeds the benchmark. In general, this method will tend to increase the size of the fund  
14            relative to the primary method (which keeps the fund size the same as under the  
15            standard wire center approach).

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17       **Q.     What are some of the policy implications of these alternatives?**

18       A.     Most obviously, the primary option is a smaller deviation from the basic wire center  
19             approach. The zone calculations are only used to distribute the support payments; they  
20             aren’t relied upon to determine the size of the fund. This is beneficial in several ways.  
21             For one thing, the zone concept is inherently controversial. By keeping the fund size  
22             unchanged, this method focuses attention on the main purpose of the zone concept  
23             (targeting support within wire centers) without triggering a debate over whether or not  
24             the fund size should be increased. This was undoubtedly one of the reasons why this  
25             was the approach proposed by the Washington Commission for its experiment, since it

1           allowed tighter targeting of support without increasing the amount of funding provided  
2           by the federal USF program. Moreover, this approach should alleviate any concern  
3           about the impact of any potential errors in the zone calculations. Since the fund remains  
4           unchanged, any problems with the zone calculations will be limited to the distribution of  
5           those amounts.

6                     Another consideration is the number of customers that will receive support.  
7           Under the primary approach, support is limited to those customers who are located in  
8           high cost zones within high cost wire centers. In contrast, under the alternative  
9           approach support is provided to all customers in high cost zones, regardless of whether  
10          their wire center has high costs overall. Stated differently, the alternative approach  
11          provides a much broader distribution of support. The main reason the fund size tends to  
12          increase under the alternative approach is because support is provided to more wire  
13          centers.

14                    From a policy perspective, this broadening of support has multiple implications.  
15          On the one hand, some may argue that all high cost customers should receive support,  
16          regardless of whether they are located in rural wire centers, or in low density portions  
17          of an urban or suburban wire center. The alternative approach is responsive to this line  
18          of reasoning. On the other hand, some may argue that the KUSF should be tightly  
19          limited to those customers most needing of support, in order to limit the fund size and to  
20          minimize administrative costs.