Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Federal-State Joint Board on Universal Service	CC Docket No. 96-45

REPLY COMMENTS OF VERIZON ON JOINT BOARD RECOMMENDED DECISION

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I. Introduction.

The Joint Board's recommendations present a proper balancing of the statutory principles in section 254 of the Act. Many parties support the Joint Board's recommendation that support be targeted to states that have average costs above 135 percent of the national average, using the standard deviation analysis and cluster analysis. Even those arguing for lower "benchmarks" agree with the Joint Board's recommendation that the Commission should use cost comparisons, rather than rate comparisons, in applying a benchmark. They agree that cost comparisons provide a consistent basis for identifying states that need additional assistance from the federal fund in order to maintain reasonably comparable rates between urban and rural areas.

The arguments of some commenters that the benchmark should be based on costs for urban areas rather than the average of all areas are inconsistent with their own recognition that

[1] The Verizon telephone companies ("Verizon") are the affiliated local telephone companies of Verizon Communications Inc. These companies are listed in Attachment A.

federal support should be given only to states that cannot maintain reasonably comparable rates using their own resources because their costs are above the national average. In addition, their proposals would result in a huge increase in the universal service fund for non-rural carriers that would put pressure on the funds available for other universal service programs and that would have an adverse impact on the statutory principle that service should be "affordable."

The criticisms of the Joint Board's justification for the 135 percent benchmark are not valid. The data in the GAO Report supports the Joint Board's finding that urban and rural rates continue to be "reasonably comparable" more than six years since the 1996 Act was passed. The Joint Board's reliance on a two standard deviation benchmark to identify high-cost states is consistent with the Commission's use of standard deviations in other ratemaking proceedings to identify cost "outliers." Even the commenters' own data confirm the results of the Joint Board's cluster analysis, which shows that the 135 percent benchmark identifies states with per-line costs that are significantly different from the costs of the other states.

The Joint Board's recommendation that states receiving support should be required to certify that they are maintaining reasonably comparable rates is responsive to the Court remand and it is consistent with the statutory principles. The supplemental rate review provides a procedural vehicle for a state to seek additional support if it does not have the means to maintain reasonably comparable rates despite using all resources available to it.

II. Even The Critics Of The Joint Board's Cost-Based Support Mechanism Agree That Support Should Be Targeted To States With Above-Average Costs.

There is general agreement among the commenters, even those opposing the Joint Board's recommended decision, that universal service support should be based on comparisons of costs, not rates. While the Joint Board recommended that the goal of non-rural high-cost support should be to enable the states to achieve reasonably comparable rates between urban and rural areas, it found that it would not be practical to use rate comparisons to target support. ***See*** Recommended Decision, ¶¶ 18-21. The commenters agree that state rates reflect numerous differences in rate structures, methods of rate regulation, and use of implicit or explicit universal service mechanisms, making any direct comparison of rates among states an unreliable indicator of a state's need for federal support. ***See, e.g.,*** Rural State Commissions, 4; Qwest, 14; Maine, 7-8. In fact, many commenters oppose the Joint Board's recommendation for a supplemental rate review, under which a state could seek additional support by showing that it is incapable of maintaining reasonably comparable urban and rural rates, on the grounds that it is difficult, if not impossible, to make meaningful comparisons of rates among states. ***See, e.g.,*** New York, 3; California, 12-13.

Where the commenters disagree, however, is whether support should be calculated by comparing the average cost per-line in each state to the national average cost per-line or to the national average *urban* cost per-line. Many commenters agree with the Joint Board that the benchmark for calculating high-cost support should rely on the national average, because only states with costs significantly above the national average need support from the federal fund to maintain reasonably comparable rates. ***See, e.g.,*** AT&T, 15-16; Sprint, 2-3; California, 9-10.

However, some commenters want the Commission to provide support to any state that has average costs above the national average cost for urban areas, arguing that this is necessary to ensure that such states are able to maintain rates in their rural areas that are reasonably comparable to rates in urban areas in other states. ***See, e.g.,*** Wisconsin, 6; Maine, 7-8, 23-27; Qwest, 12-13. There are serious flaws in this approach.

First, a high-cost fund that used a benchmark based on urban costs would provide support to any state with average costs more than 102 percent of the national average. ***See, e.g.***, Rural State Commissions, 47-48. As a result, the customers in somewhat less than half of the states would subsidize the customers in the other half of the states. ***See*** Attachment B. This would cause an almost eight-fold increase in the size of the non-rural high-cost fund, from about $218 million today to about $1.7 billion. ***See*** id. Such a huge increase in the fund would be contrary to Congress' intent in enacting section 254.

As AT&T points out (at 7-12), there is no indication that Congress intended to mandate a significant increase in federal high-cost support. If Congress had intended to do so, it would have given the Commission explicit guidance, as it did for schools, libraries, and rural health care providers in section 254(h). Instead, Congress merely established principles and guidelines for pursuing certain universal service goals, including the goal of "reasonable comparability" between urban and rural rates. But that particular goal was not to be pursued at any cost, and it must be weighed against other, sometimes competing, goals, such as the principle that service should be "affordable." The Joint Board correctly found that the statutory principle of "sufficiency" required that the fund be no larger than necessary to achieve the statutory goals. Using nationwide average costs in rural areas as the benchmark would provide more support than

is necessary for states to achieve "reasonable comparability," and it would make telephone service less affordable by inflating the universal service contribution factor.

Second, the use of an urban benchmark is not necessary to enable states to achieve reasonably comparable rates between urban and rural areas. As the GAO study shows, almost all of the states have achieved reasonably comparable, if not identical, rates between urban and rural areas within their borders. ***See*** GAO Report, App. IV. In fact, rates in rural areas within a state are often *lower* than the rates in suburban and urban areas within the same state.[2] Furthermore, the Act provides that the states may take action to preserve universal service as competition increases, including establishing intrastate funds and other measures not inconsistent with the federal scheme. ***See*** 47 U.S.C. § 254(f). Therefore, there is no need for the Commission to provide federal support to the states to help them in maintaining reasonably comparable rates within their borders.

As even the Rural State Commissions recognize, the only need for federal funding is to help states that do not have the ability to maintain rates that are reasonably comparable to rates in other states. ***See*** Rural State Commissions, 17. But since the rates in rural and urban areas in each state are almost the same, the difference between the urban rates in one state and the rural rates in another state is about the same as the difference between the average rates in each state. These rate differences, in turn, reflect the differences in statewide average costs, not the differences between rural costs in one state and urban costs in another state. Therefore, an urban

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[2] ***See*** Letter from W. Scott Randolph, Director – Regulatory Affairs for Verizon Communications, to Marlene H. Dortch, Secretary, Federal Communications Commission, CC Docket No. 96-45, Attachment 1 (filed June 26, 2002).

cost benchmark produces a misleading indication of the ability of a state to maintain rates that are reasonably comparable to the national average rates in urban areas. The best measure of the ability of a state to maintain rural rates that are reasonably comparable to urban rates in other states is the degree to which the statewide average costs in that state are significantly above the national average.

For these reasons, an urban cost benchmark would produce more support than is necessary to enable states to maintain reasonably comparable rates, and the excessive size of a fund based on an urban benchmark would be adverse to other universal service principles of sufficiency and affordability. The Commission should adopt the Joint Board's recommendation that the Commission continue to calculate high-cost support based on a comparison of a state's average cost to the national average.

III. The GAO Study Supports The Joint Board's Findings That Urban And Rural Rates Are Reasonably Comparable.

In selecting a benchmark based on 135 percent of nationwide average costs, the Joint Board relied extensively on the evidence in the GAO Report that telephone exchange rates are substantially the same in urban and rural areas within each state. ***See*** Recommended Decision, ¶¶ 35, 40. Based on these data, the Joint Board found that only states with costs significantly above the national average required federal assistance to maintain rates that are reasonably comparable.

Some commenters criticized the GAO Report, complaining that it includes the rates of both rural and non-rural carriers and that this makes it unusable in establishing a funding

mechanism just for non-rural carriers. ***See, e.g.***, Maine, 13; Rural State Commissions, 9. In fact, this is a strength, not a weakness, in the Joint Board's analysis. The GAO Report establishes that the states have been able to maintain reasonably comparable urban and rural rates in areas served by both rural and non-rural carriers. These rates are a function of a state's ability to use all of the sources of revenue from all carriers within the state to maintain reasonably comparable rates in high-cost areas served by all carriers. The data in the GAO Report support the Joint Board's conclusion that the states have been able to maintain reasonably comparable rates despite six years of competitive entry resulting from the 1996 Act, and that high-cost support should be targeted at states that need additional assistance because they have substantially higher costs than the national average. In addition, rates in the survey are generally the same in various localities within a state regardless of whether they are served by rural or non-rural carriers. This supports the Joint Board's conclusion that urban and rural rates throughout the country generally are reasonably comparable and that high-cost support should be targeted to the outliers. Elimination of the rates for rural carriers would not have a material impact on the Joint Board's conclusions. Although the Joint Board's recommendation necessarily was limited to the funding mechanism for non-rural carriers, the data in the GAO Report supports its determination that targeting support to states that have average costs two standard deviations above the mean will be effective in helping the states to maintain reasonably comparable rates.

Some commenters argue that the GAO study is flawed because it does not include business exchange rates. ***See, e.g.,*** Maine, 14; Rural State Commissions, 10. But, in fact, it does. The GAO study includes a review of single line business rates. Based on these data, Verizon showed in its comments that the nationwide average business rates in urban, suburban,

and rural areas were reasonably comparable, with average business rates in rural areas actually 10 percent *lower* than business rates in urban areas. ***See*** Comments of Verizon, at 4 (filed Apr. 10, 2002). In addition, the data that Verizon submitted from the GAO Report showed that business rates in urban and rural areas within each state were reasonably comparable, if not virtually identical.[3]

Some commenters argue that the Joint Board drew the wrong conclusions from the GAO Report, comparing the differences in the national averages in urban, suburban, and rural areas rather than the differences in each state from the national average. ***See, e.g.,*** Rural State Commissions, 10-11. To the contrary, the Joint Board also used the standard deviation analysis to evaluate the state-to-state variations from the mean. ***See*** Recommended Decision, ¶ 35.

Finally, some commenters argue that the sample size in the GAO Report was too small to be statistically valid for any particular state, and that the report did not pick consistent rates in each area. ***See, e.g.,*** Rural State Commissions, 11-12. These criticisms are not valid considering the objective of the report and the Joint Board's use of the report. GAO included communities throughout the country (selected at random), including all metropolitan statistical areas ("MSAs") in states with three or fewer MSAs. ***See*** GAO Report, 29. GAO provided detailed instructions to the state commissions to provide information on rates in these communities for basic local exchange service, both unlimited/flat rate service excluding optional extended area service plans and the lowest rate message or measured service for primary line, single party dial-

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[3] ***See*** Letter from W. Scott Randolph, Director – Regulatory Affairs for Verizon Communications, to Marlene H. Dortch, Secretary, Federal Communications Commission, CC Docket No. 96-45, Attachment 1 (filed June 26, 2002).

tone service with touch tone or equivalency. ***See*** GAO Report, 46. This produced a representative survey of urban, suburban, and rural rates throughout the country. No commenter disputes the fact that the similarity of urban, suburban, and rural rates within each state in the GAO Report is representative of the geographic averaging of rates in each state. The differences noted by the commenters in terms of the types of services provided with "basic" service, the scope of local calling areas, etc., are precisely the kinds of differences that make it impractical to develop a support benchmark based on rates rather than costs. It would be unreasonable to expect GAO to unravel differences in rate structures in each state and to construct rates for hypothetical "equivalent" services when the Joint Board itself finds this to be impractical for the Commission to attempt.

The GAO Report is the best data in the record concerning the extent to which the states have been able to maintain reasonably comparable rates. It is unlikely that a more detailed study would produce different results. In any event, the Joint Board did not propose that the Commission target support using the GAO study. Rather, it recommended the use of cost differences from the proxy model, which applies consistent assumptions in each state. The GAO Report provides data that supports the Joint Board's findings about how the cost data should be applied. For this purpose, a more detailed rate survey would not justify the cost, delay or burden on survey subjects.

IV. The Standard Deviation And Cluster Analyses Support The Joint Board's 135 Percent Benchmark.

Based on the data in the GAO Report showing that urban and rural rates remain reasonably comparable, and finding that 95 percent of rates fall within two standard deviations of

the mean, the Joint Board recommended that the Commission adopt a cost benchmark based on two standard deviations for identifying states with above-average costs that need additional federal assistance. ***See*** Recommended Decision, ¶ 35. Based on the Commission's proxy model, the nationwide average per-line cost plus two standard deviations equaled 132 percent of the mean. Using this and a cluster analysis, the Joint Board recommended providing high-cost support to states with costs that are more than 135 percent above the national average. ***See*** id., ¶¶ 36-37. Verizon and other commenters agreed that this is a reasonable basis for identifying states that are true outliers needing additional assistance from the federal fund to maintain reasonably comparable rates. ***See, e.g.,*** Verizon, 11-12; AT&T, 14-15; Sprint, 2; California, 8.

Some commenters oppose the 135 percent benchmark, arguing against both the Joint Board's reliance on two standard deviations and the validity of its cluster analysis. ***See, e.g.,*** Qwest, 14-16; Rural State Commissions, 18-23; Maine, 16-18. Their criticisms of the Joint Board's recommendations are not valid.

These commenters argue that the standard deviation analysis is not valid because the data in the GAO Report and in the Bureau's cost model are not normally distributed, *i.e.*, there are more observations in the high-cost "tail" of the distribution than in the low cost "tail." ***See, e.g.,*** Rural State Commissions, 18-20. However, standard deviations can be calculated for any data distributions, not only those that are normally distributed. ***See*** attached Declaration of Eugene J. Goldrick, ¶ 8. In addition, the Joint Board already addressed this issue. ***See*** Recommended Decision, n. 91. It noted that the use of two standard deviations in these circumstances identifies more high-cost lines than would occur in a normal distribution, but that doing so provides more support to the states, which is in line with the objectives of the fund. In fact, the long "tail"

means that the Joint Board's approach would provide support to 8 states, or 15 percent of the total jurisdictions. ***See*** Recommended Decision, n. 91. Since the commenters who raise this issue advocate more support rather than less, they are in no position to argue that the application of two standard deviations to a non-normal curve provides too much support to the states.

These commenters also argue that the use of two standard deviations does not produce as much support as the Joint Board intended, since 5 percent of the observations are normally outside two standard deviations, but only half of those observations are in the high-cost "tail" that identifies states that will receive support. ***See, e.g.***, id., 19-20. However, the Joint Board never said that its analysis was designed to provide support to 5 percent of the lines. Rather, it found that the two standard deviation analysis would identify "true outliers," since in a population with a normal distribution, 5 percent of the observations would be above or below that level. The Joint Board was well aware that only the observations in the high-cost "tail" would be identified for support. It also noted that this was not a normal distribution, and that applying the two standard deviation test with more observations in the high-cost tail would identify more states than would be expected in a normal distribution. However, as noted, the Joint Board found that this was consistent with the objective of providing high-cost support to more lines.

These commenters also argue it is statistically invalid to use the standard deviation analysis to identify the states that require support to maintain reasonably comparable rates, because that analysis is appropriate only for testing the hypothesis that a sample is statistically different from the general population. ***See, e.g.,*** Rural State Commissions, 22. However, calculations of standard deviations are used for many purposes other than testing hypotheses.

See Goldrick Declaration, ¶ 7. As the Joint Board pointed out, the Commission and the state commissions have used standard deviation analyses in many other ratemaking proceedings to identify data that are significantly different from the general population of observations. ***See*** Recommended Decision, ¶ 36. The Commission has used either one or two standard deviations to identify outliers depending on the regulatory objectives and the circumstances in each case. For example, in its investigation of physical collocation tariffs, the Commission excluded costs from the industry average that were two standard deviations above the industry average and then disallowed individual costs that were one standard deviation above the industry average. ***See*** *Local Exchange Carriers' Rates, Terms and Conditions for Expanded Interconnection Through Physical Collocation for Special Access and Switched Transport*, 12 FCC Rcd 18730, ¶¶ 130, 149 (1997). In other proceedings, the Commission has found that the standard deviation analysis is useful in identifying costs that were "anomalously high" and that warranted suspension. ***See, e.g.,*** *Bell Operating Companies' Tariff for the 800 Service Management System, Tariff F.C.C. No. 1 and 800 Data Base Access Tariffs*, 8 FCC Rcd 3242, ¶ 19 (1993). There is substantial precedent for the Commission to use the standard deviation analysis as a regulatory tool.

These commenters also complain that the Joint Board did not justify its decision that only "true outliers" should receive support and that using two standard deviations to target support would result in reasonably comparable rates. ***See, e.g.,*** Maine, 17. However, the Joint Board started from the premise that Congress considered rates to be "reasonably comparable" at the time that the 1996 Act was passed, based on its analysis of the legislative history of section 254 and the Congressional intent to deal with *future* changes that might impact universal service as competition developed. ***See*** Recommended Decision, ¶ 34 & n. 87-88. The Joint Board

reviewed the GAO survey of rates throughout the country and determined that the vast majority of rates continued to be reasonably comparable and similar to the range of rates at the time of the 1996 Act. Therefore, providing high-cost support to states that do not have costs significantly above the average would provide more support than is necessary to maintain the status quo that existed at the time of the 1996 Act, and that Congress was trying to preserve. Since 95 percent of rates in a normal distribution fall within two standard deviations of the mean, targeting support to states with costs above two standard deviations would meet the objective of providing assistance only to states that truly need it and to put a limit on how much cost a state would have to bear alone above a certain level. The choice of two standard deviations is not "arbitrary," as these commenters allege – it is a regulatory judgment that grows out of the Joint Board's factual findings and its interpretation of congressional intent.

Some commenters argue that the Joint Board's cluster analysis is arbitrary and that it does not support the selection of a benchmark. ***See*** Qwest, 15-16; Maine, 16-17. They argue that a cluster analysis merely shows that a group of states receiving support have similar characteristics, not whether those are the only states that have rates that are not reasonably comparable. These criticisms have no merit. The Joint Board only used the cluster analysis to confirm the results of the 135 percent benchmark produced by the standard deviation analysis. The fact that the eight states that receive support under the 135 percent benchmark form a distinct cluster of states that are more similar in cost characteristics among themselves as compared to the other states empirically supports the Joint Board's finding that the two standard deviation analysis identifies "true outliers." Moreover, even Qwest's statistical expert admits that his alternative cluster

analyses identified the same eight states that would receive high-cost support under the 135 percent benchmark as being in a distinct group of the highest cost states.[4]

The Joint Board's analysis is statistically sound. However, the Commission should separate the issue of the selection of a benchmark from the issue of how to implement that benchmark. Although the Joint Board applied the benchmark to the per-line costs produced by the proxy cost model, that model does not represent the actual costs of providing service. Rather, it is a hypothetical model that assumes construction of a brand new network, from scratch, using the most technologically advanced equipment at the lowest current prices for a network that meets the design criteria set by the Commission rather than by the carriers. In other words, it has no basis in reality. Just recently, the Wireline Competition Bureau found that a change in the computer language used for one of the components of the model and a couple of "technical" corrections to the model may reduce support levels substantially in some states and could eliminate support entirely for two states. ***See*** *Federal-State Joint Board on Universal Service*, Order, DA 03-24 (rel. Jan. 7, 2003). This demonstrates that the results of the model are a function of its formulas and assumptions rather than a reflection of changes in real-world costs. While not necessary for purposes of resolving the issues on remand, the Commission should

[4] Qwest, Declaration of Aniruddha Banjeree, ¶¶ 34, 36. Dr. Banjeree states that one way to do cluster analysis is to (1) use hierarchical clustering at the first step to arrive at a tentative choice of the number of clusters and (2) with that number of clusters so set, use the partitioning method to refine the formation of those clusters. ***See*** id., ¶ 20. Following the first step of this approach, Table 1 of Dr. Banjeree's declaration produces four clusters. In the next step, if four clusters are formed using the partitioning method, eight states form the highest cost cluster under both the k-Means Non-hierarchical Clustering (Table 2) and the k-Medians Non-hierarchical Clustering (Table 3). These eight states are the same ones identified by the Commission's 135 percent benchmark. ***See*** Declaration of Eugene Goldrick, ¶ 12.

initiate a proceeding to revisit its reliance on the flawed proxy cost model in applying the benchmark to target support. Instead, the Commission should consider using a carrier's actual per-line costs from its ARMIS reports, as it did in the previous high-cost fund and as it is doing with the rural carrier fund. The Commission should ground its policies in the real world of reported costs as it did in the previous funding mechanisms.

V. The Joint Board's Certification Proposal Meets The Court's Mandate.

To address the Court's directive that the Commission should establish some sort of inducement for the states to ensure reasonable comparability of urban and rural rates within a state, the Joint Board recommended that the Commission expand the current annual certification process to require a state to certify that rates in high-cost areas receiving universal service support are reasonably comparable to a national rate benchmark. ***See*** *Recommended Decision*, ¶¶ 50-51. Several commenters agreed with Verizon that this certification requirement would be sufficient to meet the Court's mandate. ***See, e.g.***, Verizon, 12-13; California, 11; Missouri, 2; Wisconsin, 4-5.

Some commenters argue that this certification process is not sufficient. For example, Qwest argues (at 8-10) that the inducement would only affect the eight states that would receive high-cost support, and that nothing would prevent these eight states from meeting the certification requirement by employing geographic rate averaging rather than implementing explicit state universal service funding mechanisms. ***See also*** Wyoming, 8. However, this is a solution in search of a problem. As the GAO Report shows, the states have done a good job of maintaining reasonably comparable rates between urban and rural rates within their borders, and

it is only the high-cost states that need additional federal support to maintain rates within a reasonable range of the national average.[5] Moreover, the statute does not prohibit the states from continuing to use geographic rate averaging to maintain reasonably comparable rates. Section 254(f) gives the states the authority to establish state universal service programs that do not conflict with the federal scheme, but it does not require them to do so. The constitutional scheme does not permit the federal government to order the states to take any particular action on matters within their jurisdiction. ***See, e.g.,*** *New York v. U.S.* 112 S.Ct. 2408 (1992). The Commission can offer inducements for states to cooperate with the goals of federal programs, but it cannot dictate to the states how to structure state rates or to provide for recovery of state costs. The proposals for an expansive, intrusive federal funding mechanism go far beyond the Court's mandate and the Commission's authority.

The Rural State Commissions take the opposite tack, arguing (at 33-38) that the Commission cannot and should not condition federal support on a state's certification that it has established reasonably comparable rates in urban and rural areas within its borders. It provides a hypothetical example of a high-cost state that "deserves" federal support, but that would be denied such support because that state had not established reasonably comparable rates within its

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[5] Even if the Commission adopted a much lower urban cost benchmark as Qwest and others advocate, as substantial number of states would still not receive support from the federal fund. Therefore, under these commenters' view, these states would still have no inducement to maintain reasonably comparable rates. Followed to its logical conclusion, the Qwest approach would require the Commission to take enough money from the universal service charges to be able to offer support for all states, regardless of need, on the condition that they adopt rate designs that meet the Commission's view of reasonable comparability. Such a taxing scheme, taking money from the states just so that the Commission could place conditions before returning it, would not be consistent with the universal service principles of section 254.

borders, either by rate averaging or by use of an explicit state universal service mechanism. But this was exactly the Court's point – without an inducement for the states to achieve reasonably comparable rates, the Commission's high-cost fund would not promote this statutory principle. The only "carrot" or "stick" that the Commission can employ is its ability to condition the grant or denial of federal support on a state's showing that it is doing what it can to promote reasonably comparable rates.

The Joint Board also proposed a "supplemental rate review" to establish a framework for a state to demonstrate that it needs additional federal support to maintain reasonably comparable rates. ***See*** Recommended Decision, ¶¶ 54-56. Some commenters argued that the supplemental rate review would not go far enough, while others argued that it would go too far. For example, Wyoming argues (at 8) that the Joint Board's recommendations contain no standards to guide the states in establishing the need for additional funding, no indication of what amounts would be available, and no other information showing that this mechanism would provide sufficient support. Several other commenters oppose the supplemental rate review as being too open-ended and likely to cause unwarranted increases in the size of the high-cost fund. ***See, e.g.,*** California, 15. In addition, these commenters argue that the rate review is inconsistent with the Joint Board's recommendation that the Commission use cost comparisons, rather than rate comparisons, to target support, and that it suffers from the same practical difficulties that caused the Joint Board to reject rates as meaningful means of making comparisons among states. ***See, e.g.,*** AT&T, 17-18; New York, 3.

While the supplemental rate review is not without its administrative difficulties, it provides a mechanism for a state to seek additional support based on unique circumstances that

are not satisfied by the results of the Commission's proxy cost model. This "safety valve" should be available only if a state satisfies a high hurdle of showing that it does not have the means to maintain reasonably comparable rates despite existing federal assistance and other resources available to it.

VI. Conclusion

For the foregoing reasons, the Commission should accept the Joint Board's Recommendations for the non-rural high-cost fund.

Respectfully submitted,

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ATTACHMENT A

THE VERIZON TELEPHONE COMPANIES

The Verizon telephone companies are the local exchange carriers affiliated with Verizon Communications Inc. These are:

Contel of the South, Inc. d/b/a Verizon Mid-States
GTE Midwest Incorporated d/b/a Verizon Midwest
GTE Southwest Incorporated d/b/a Verizon Southwest
The Micronesian Telecommunications Corporation
Verizon California Inc.
Verizon Delaware Inc.
Verizon Florida Inc.
Verizon Hawaii Inc.
Verizon Maryland Inc.
Verizon New England Inc.
Verizon New Jersey Inc.
Verizon New York Inc.
Verizon North Inc.
Verizon Northwest Inc.
Verizon Pennsylvania Inc.
Verizon South Inc.
Verizon Virginia Inc.
Verizon Washington, DC Inc.
Verizon West Coast Inc.
Verizon West Virginia Inc.

Benchmark Set at 102% Compared to 135% Benchmark

Attachment B

	Summary of Cost Data - Hybrid Cost Model				Proxy Support - by state		Proxy Support - by state		Method Variances	
					Benchmark	135%	Benchmark	102%	102% vs 135%	
					Federal Pay %	76%	Federal Pay %	76%	Benchmark	
State	Total Annual Cost	Model Switched Lines	State Avg. Cost	Reported Part36 Switched Lines	$ /Line / Mo.	Annual Support	$ /Line / Mo.	Annual Support	Annual Support	Monthly Support Per-Line Change
AK	$ 47,606,124	180,186	$ 22.02	186,022	$ -	$ -	-	$ -	$ -	$ -
AL	865,866,302	2,280,305	31.64	2,302,419	1.56	42,964,386	7.05	194,880,653	151,916,267	5.50
AR	351,484,597	1,047,373	27.97	1,081,111	-	-	4.26	55,249,328	55,249,328	4.26
AZ	729,519,937	2,932,145	20.73	2,949,600	-	-	-	-	-	-
CA	5,067,623,703	22,998,340	18.36	23,463,022	-	-	-	-	-	-
CO	803,111,792	2,865,875	23.35	2,869,409	-	-	0.75	25,925,226.76	25,925,227	0.75
CT	673,485,779	2,543,927	22.06	2,441,546	-	-	-	-	-	-
DC	153,396,463	797,380	16.03	902,885	-	-	-	-	-	-
DE	143,575,674	592,734	20.19	591,238	-	-	-	-	-	-
FL	2,171,135,966	9,106,973	19.87	9,166,212	-	-	-	-	-	-
GA	1,162,774,362	4,376,544	22.14	4,355,366	-	-	-	-	-	-
HI	179,346,068	719,547	20.77	720,508	-	-	-	-	-	-
IA	327,200,307	1,122,661	24.29	1,122,247	-	-	1.46	19,707,473.77	19,707,474	1.46
ID	170,641,159	528,208	26.92	530,126	-	-	3.47	22,043,351	22,043,351	3.47
IL	1,821,741,334	7,308,235	20.77	7,670,580	-	-	-	-	-	-
IN	942,093,717	3,245,552	24.19	3,273,316	-	-	1.39	54,550,252	54,550,252	1.39
KS	426,845,419	1,439,125	24.72	1,448,337	-	-	1.79	31,102,621	31,102,621	1.79
KY	687,489,744	1,923,592	29.78	1,931,471	0.14	3,283,972	5.64	130,724,707	127,440,736	5.50
LA	767,352,923	2,420,442	26.42	2,424,355	-	-	3.08	89,703,743	89,703,743	3.08
MA	986,590,943	4,286,443	19.18	4,514,756	-	-	-	-	-	-
MD	883,013,323	3,697,297	19.90	3,908,180	-	-	-	-	-	-
ME	255,697,552	700,511	30.42	728,137	0.62	5,453,035	6.12	53,496,363	48,043,328	5.50
MI	1,635,348,396	5,798,891	23.50	6,101,225	-	-	0.87	63,368,700	63,368,700	0.87
MN	597,396,677	2,236,841	22.26	2,341,719	-	-	-	-	-	-
MO	919,172,154	3,055,016	25.07	3,080,710	-	-	2.06	76,160,610	76,160,610	2.06
MS	614,526,179	1,355,415	37.78	1,367,455	6.22	102,081,069	11.72	192,307,345	90,226,275	5.50
MT	149,973,153	381,865	32.73	383,238	2.38	10,944,679	7.88	36,231,169	25,286,490	5.50
NC	859,905,359	3,090,498	23.19	3,091,144	-	-	0.63	23,251,253	23,251,253	0.63
ND	68,385,305	237,745	23.97	215,430	-	-	1.22	3,159,427	3,159,427	1.22
NE	270,471,455	799,131	28.20	787,554	-	-	4.44	41,965,216	41,965,216	4.44
NH	240,862,788	799,842	25.09	805,073	-	-	2.08	20,064,886	20,064,886	2.08
NJ	1,412,577,101	6,506,066	18.09	6,632,114	-	-	-	-	-	-
NM	265,534,598	860,920	25.70	863,773	-	-	2.54	26,315,652	26,315,652	2.54
NV	295,597,473	1,249,257	19.72	1,233,046	-	-	-	-	-	-
NY	2,866,004,645	12,219,061	19.55	12,493,191	-	-	-	-	-	-
OH	1,648,240,659	5,879,106	23.36	5,944,681	-	-	0.76	54,266,127	54,266,127	0.76
OK	578,064,684	1,825,988	26.38	1,867,290	-	-	3.05	68,447,884	68,447,884	3.05
OR	544,192,688	1,936,861	23.41	1,931,811	-	-	0.80	18,531,109	18,531,109	0.80
PA	1,675,785,764	6,765,273	20.64	6,969,997	-	-	-	-	-	-
PR	310,207,035	1,038,800	24.89	1,337,620	-	-	1.92	30,778,420	30,778,420	1.92
RI	163,661,099	682,223	19.99	666,116	-	-	-	-	-	-
SC	537,098,374	1,717,517	26.06	1,724,608	-	-	2.81	58,160,404	58,160,404	2.81
SD	88,713,618	266,191	27.77	273,178	-	-	4.11	13,479,647	13,479,647	4.11
TN	871,832,501	2,754,603	26.38	2,747,107	-	-	3.05	100,539,704	100,539,704	3.05
TX	3,172,312,781	12,070,018	21.90	12,217,838	-	-	-	-	-	-
UT	293,041,982	1,152,208	21.19	1,148,010	-	-	-	-	-	-
VA	1,101,934,406	4,196,934	21.88	4,230,096	-	-	-	-	-	-
VT	139,271,362	358,470	32.38	358,567	2.11	9,089,414	7.61	32,748,082	23,658,669	5.50
WA	908,026,140	3,391,330	22.31	3,450,933	-	-	-	-	-	-
WI	690,510,146	2,532,806	22.72	2,564,043	-	-	0.27	8,344,391	8,344,391	0.27
WV	342,647,057	853,983	33.44	861,393	2.92	30,161,611	8.42	86,997,324	56,835,713	5.50
WY	105,276,590	260,199	33.72	260,434	3.13	9,785,356	8.63	26,969,095	17,183,739	5.50
Total	$ 42,984,165,359	163,386,453		166,530,236		$ 213,763,521	-	$ 1,659,470,163	$ 1,445,706,642	$ 0.72
Average			$ 21.92							

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Federal-State Joint Board on Universal Service	CC Docket No. 96-45

Declaration of Eugene J. Goldrick

1. My name is Eugene J. Goldrick. I am employed by Verizon Services Group as a Statistician within the Verizon Service Costs organization. I am responsible for the statistical aspects of the cost studies and other work produced by the Service Costs organization. I received a Bachelor's Degree in Economics from the State University of New York at Stony Brook in 1978, and a Master's Degree in Economics from the State University of New York at Stony Brook in 1981. I completed all coursework for a Ph.D. in Economics from New York University in 1989.

2. I have been employed by Verizon and its predecessor corporations ("the Company") since 1984. During that time, I have worked on a diverse set of statistical modeling and sampling projects. I have designed and carried out large stratified random sampling studies for numerous applications and I have specified and estimated non-linear regression models. I have developed statistical classification models to predict customer responses. I have presented expert statistical testimony before several state commissions and the FCC.

3. The purpose of my declaration is to address some of the issues raised in the comments concerning the validity of the statistical analyses conducted by the

Federal/State Joint Board in its October 16, 2002 Recommended Decision. I will describe what reasonably can be inferred from the Joint Board's analysis of the GAO Report, their standard deviation analysis, and their cluster analysis. I will explain how the evidence from the three sources, when taken jointly, demonstrates that the 135% benchmark is eminently reasonable and is not subject to most of the criticisms that have been leveled upon it.

The Joint Board's Analysis of the GAO Report

4. The Joint Board's use of the GAO Report makes perfect sense. Due to the existence of state boundaries, the difference between urban and rural local exchange rates throughout the nation is separated into 2 categories: (1) the difference between urban and rural rates within the states, and (2) the differences in average rates among states. Average rates differ among states because of their differing mixes of urban, suburban, and rural lines as well as differences in carrier costs and local conditions. The Joint Board's analysis of the GAO Report was valuable because it revealed that the differences in local exchange rates within each state were quite small, and differences between national averages for urban, suburban and rural rates were approximately 2%. ***See*** Recommended Decision, ¶ 34. These small differences are probably due to the extensive geographic averaging of local exchange rates within most states. Since urban and rural rates are already reasonably comparable within states, the remaining differences (nationwide) between urban and rural rates show up as differences in average rates among states. This key finding from the GAO Report permits the Joint Board to develop a support mechanism based solely on differences in average local exchange rates among states, secure in the knowledge that rates are already reasonably comparable within states.

In light of this evidence, the Joint Board's development of a support standard based on statewide average costs is reasonable and appropriate.

The Joint Board's Two Standard Deviations Analysis

5. The Joint Board recommended a cost benchmark of 135 percent of the national average cost per line based primarily upon a standard deviation analysis. Since this analysis has come under heavy attack by some parties, an explanation of the Joint Board's standard deviation analysis and its correct interpretation is warranted.

6. The standard deviation, (and its square, known as the variance) is the most widely used measure of dispersion in statistics. Intuitively, the standard deviation measures how "spread out" the individual data points are around the average. In statistical analysis, a two standard deviation "decision rule" is sometimes used to determine whether or not a particular claim about the world is consistent with the available data. In the typical application of this type, the data are assumed to be normally distributed, or at least approximately so. In this case, approximately 2.5% of the samples generate statistics that are more than 2 standard deviations above the mean.

7. Testing a hypothesis is not, however, the only application where standard deviation analyses have validity. Analysis of data that are two standard deviations above the average can often highlight data points that are not like the central bulk of the data. Clearly, this was the purpose of the Joint Board's analysis. The Joint Board's use of the two standard deviations rule was not intended to be the definitive rule for identifying high cost states. It was an analysis used in conjunction with the Joint Board's other analyses in order to arrive at a policy determination regarding the adoption of a cost benchmark.

8. In his declaration on behalf of Qwest, Dr. Banerjee (at n.7) makes the following criticism of the Joint Board's use of the two standard deviation analysis;

> " ... this is clear evidence of a misapplication of the two standard deviations rule intended for normally distributed data to an <u>actual</u> distribution that is not even remotely normal ... "

This criticism is incorrect and it entirely misconstrues the purely indicative purpose of the Joint Board's standard deviation analysis. Contrary to Dr. Banerjee's claim, standard deviations are not intended solely for use with normally distributed data.[1] Standard deviations are relevant, not only for normal distributions, but for most of the distributions used in statistics.[2] Standard deviations can always be calculated quite easily for any set of data.[3] The standard deviation is an important parameter in the description of any data distribution, not just the normal.[4] It is the most commonly used measure of dispersion in statistics.[5] It has numerous applications in statistics outside the realm of normally distributed data.[6]

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[1] It turns out that the state cost per line data has a distributional asymmetry that is typical of data with a fixed lower bound of zero but no corresponding upper bound; the lower tail of the distribution is shorter than the upper tail. As a result, a greater proportion of states lie more than 2 standard deviations above the mean than lie 2 standard deviations below it.

[2] ***See*** Galen R. Shorack, Probability for Statisticians, Springer 2000, p. 46.

[3] ***See*** Bernard W. Lindgren, Statistical Theory, 3rd Edition, Macmillan 1976, p. 212.

[4] ***See*** Lindgren, Statistical Theory, p. 127.

[5] ***See*** M. G. Bulmer, Principles of Statistics, Dover 1979, p. 56 and Lindgren, Statistical Theory, p. 128.

[6] The variance, which is the square of the standard deviation, is used to prove some of the most important theorems in statistics. It is used to prove the various laws of large numbers. It is also a key parameter in the family of exponential distributions, which is the most widely used class of distributions for the statistical modeling of *non-normally* distributed data. ***See*** John W. Lamperti, Probability, 2nd Edition, Wiley 1996, Chapter 2 and Luigi Pace, Alessandra Salvan, Principles of Statistical Inference, World Scientific, 1997, pp. 171, 181, Chapter 6 and Ludwig Fahrmeier and Gerhard Tutz, Multivariate Statistical Modeling Based on Generalized Linear Models, 2nd Ed., Springer 2001, Ch. 2.

9. The Joint Board was well aware that the statewide average cost data were not normally distributed and that it had a "long upper tail" into which high cost states would fall. The Joint Board acknowledged that "this measurement [2 standard deviations] may generate more [states] than [would be] expected in a normal distribution." Recommended Decision, n.91. In other words, the Joint Board knew that the long upper tail of the actual cost per line data distribution (which does not appear in the normal distribution) is the reason that the two standard deviations approach permits 15 percent of the states to qualify for support while only a few states would qualify if the data followed a normal distribution. In this sense, the Joint Board's 135% standard is "generous" with respect to the identification of high cost states, at least relative to the normal data distribution case which Dr. Banerjee claims is required in order to make proper use of the two standard deviation rule.

10. Dr. Banerjee also criticizes (at ¶ 13) the Joint Board's failure to examine the actual distribution of the cost per line data. He states in his declaration that;

> "... the biggest drawback in the Joint Board's mechanical application of the two "standard deviations" rule is its failure to explore the actual (or empirical) distribution of average cost by state ..."

This is simply not correct. The Joint Board acknowledged that the actual (or empirical) distribution of the statewide average cost data is not normal. ***See*** Recommended Decision, n. 91. In fact, the Joint Board noted that, while only 5 percent of observations normally are outside two standard deviations of the mean (half of this would be above the upper bound in a normal distribution), 8 states (approximately 15% of the total jurisdictions) actually qualify for support based on the actual distribution of the data. The

latter calculation makes explicit use of the actual (or empirical) distribution of the average cost by state.

11. Dr. Banerjee also criticizes the Joint Board for not applying some computationally intensive and fairly advanced statistical techniques, like the bootstrap, in order to reveal what the true data distribution would look like. This criticism is totally unfounded. One does not have to apply bootstrapping techniques in order to determine that the data distribution is not normal and that it has a long upper tail. In most cases (including this one), this can be easily accomplished by graphing the data. The graph attached to this declaration shows the shape of the actual cost-per-line distribution. It is obvious from the graph that the data do not follow a normal distribution. The graph also shows that the upper tail of the distribution is longer than the lower tail. This pattern is typical of data with a fixed lower bound (of zero, in this instance) but no fixed upper bound. This fact alone rules out the possibility that the data are normally distributed since the normal distribution has no lower bound at all.

The Joint Board's Cluster Analysis

12. Dr. Banerjee provides an elaborate description of the numerous available clustering algorithms and a discussion of some of the issues surrounding them. However, very few of them are relevant given the simple structure of the data (only one variable) and the small number of data points. In these circumstances, all that a cluster analysis can accomplish (and all that it really needs to accomplish) is a grouping of the states into a few (say 2 to 7) clusters. The grouping should be such that the variation[7] in cost per

[7] Measured as squared deviation from the mean. Using this measure of dissimilarity is the cluster-analysis equivalent of running a simple linear regression.

line among the states is minimized within the clusters and maximized between them. Once this is accomplished, it then makes sense to check whether the grouping that results corresponds in a meaningful way to the grouping implied by the Joint Board's 135% benchmark. This is the approach taken by the Joint Board. While Dr. Banerjee performed many different cluster analyses based on many different assumptions, the two analyses that he recommends actually support the Joint Board's conclusions here. One appears in his Table 2 as the k-means, 4-cluster scenario. The other is the k-median, 4-cluster scenario in Table 3. Both of these analyses identify Kentucky, Maine, Alabama, Vermont, Montana, West Virginia, Wyoming, and Mississippi as belonging to the highest-cost cluster. These are the same states identified by the 135% benchmark. This confirms, rather than contradicts, the Joint Board's analysis. Although Dr. Banerjee states that the two-cluster analysis produces a larger group of high cost states, he admits (at ¶ 36) that he considers the results of his 4 cluster analyses to "make more sense." Moreover, even within the class of k-means clusters, a simple statistic for identifying the number of clusters indicates that 4 are reasonable.[8] Of course, the cluster analysis is not definitive, but it is another indication that a 135% benchmark clearly identifies the high-cost states.

13. The Joint Board's standard deviation and cluster analyses are statistically sound. Both are valid as evidence in supporting a benchmark that, ultimately, is a policy decision rather than a mechanical result of mathematical tests.

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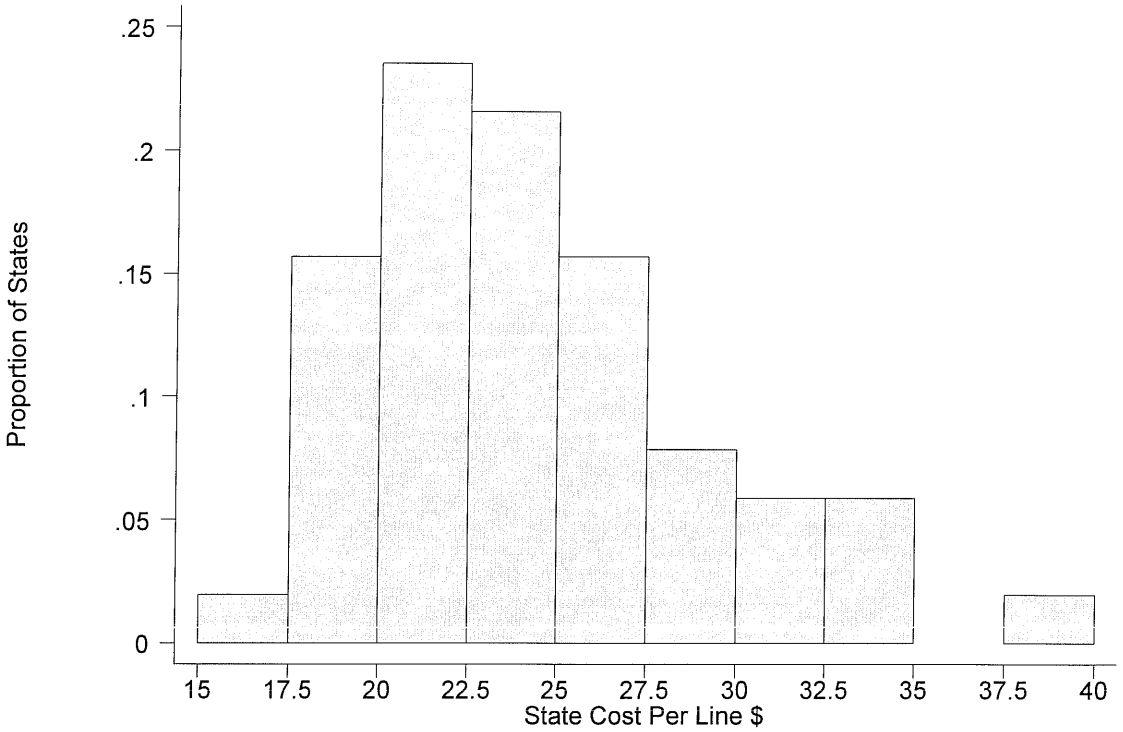
[8] This statistic was developed by Calinski and Harabasz (1974). It was shown to be one of the better criteria for selecting the number of clusters by Milligan and Cooper (1985). It involves the ratio of the between-cluster-sums-of-squares to the within-clusters-sums-of-squares, adjusted for degrees of freedom. ***See*** Andrew Webb, Statistical Pattern Recognition, 2nd Ed., Wiley 2002, p. 398.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information and belief.

Executed on January 16, 2002

Eugene J. Goldrick

ATTACHMENT

HISTOGRAM OF STATES' COST PER LINE