BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re:
Investigation into the Establishment of
Operations Support Systems Permanent
Performance Measures for Incumbent Local
Exchange Telecommunications Companies
_____/

Docket No. 000121-TP
Filed: March 2, 2001

(REVISED) DIRECT TESTIMONY

OF

GEORGE S. FORD

ON BEHALF OF

Z-TEL COMMUNICATIONS, INC.

(REVISED) DIRECT TESTIMONY OF GEORGE S. FORD

PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is George S. Ford. I am the Chief Economist for Z-Tel Communications, Incorporated (Z-Tel). My business address is 601 South Harbour Island Boulevard, Suite 220, Tampa, Florida 33602.

Q. BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND AND RELATED PROFESSIONAL EXPERIENCE.

A. I received a Ph.D. in Economics from Auburn University in 1994. My graduate work focused on the economics of industrial organization and regulation with course work emphasizing applied price theory and statistics. In 1994, I became an Industry Economist at the Federal Communications Commission in the Competition Division of the Office of the General Counsel. The Competition Division of the FCC was tasked with ensuring that FCC policies were consistent with the goals of promoting competition and deregulation across the communications industries. In 1996, I left the FCC to become a Senior Economist at MCI Worldcom where I was employed for just over three years. While at MCI Worldcom, I filed declarations and economic studies on a variety of topics with both federal and state regulatory agencies. In addition to my professional experience, I was an Affiliated Scholar with the Auburn Policy Research Center at Auburn University in Alabama. Through this professional relationship, I maintained an active research agenda on communications issues and have published research papers in a number of academic journals *Journal of Law and Economics*, the *Journal of Regulatory Economics*, the *Review of Industrial Organization*, among others. I regularly speak at conferences, both at home and abroad, on the

economics of telecommunications markets and regulation.

Q. COULD YOU DESCRIBE Z-TEL'S SERVICE OFFERINGS?

A. Z-Tel's is a Tampa-based, integrated service provider that presently provides competitive local, long distance, and enhanced services to over 300,000 residential consumers across twenty states including New York, Pennsylvania, Massachusetts, Texas, Michigan, Oregon, California, Georgia, among others. Z-Tel plans to expand nationally as the unbundled network element platform (UNE-P) becomes available at TELRIC rates.

Z-Tel s service is not just a simple bundle of traditional telecommunications services, but is unique in that is combines its local and long distance telecommunications services with Web-based software that enables each Z-Tel subscriber to organize his or her communications, including email, voicemail, fax, and even a Personal Digital Assistant (PDA), by accessing a personalized web-page via the Internet. In addition, the personal Z-Line number can be programmed to follow the customer anywhere he or she goes via the Find Me feature. Other service features include low long distance rates from home or on-the-road and message notification by phone, email, or pager. Customers can also initiate telephone calls (including conference calls in the near future) over the traditional phone network, using speed-dial numbers from their address book on their personalized web page.

Q. WHAT INTEREST DOES Z-TEL COMMUNICATIONS HAVE IN THIS PROCEEDING?

A. The Z-Tel service bundles many different communications services voicemail, email, fax, Internet, PDAs, local and long distance telecommunications into an easy-to-use communications control center.

An important element of that bundle is local exchange telecommunications service. To provide the local exchange portion of its service offering, Z-Tel must purchase unbundled network elements from incumbent local exchange carriers. At present, the primary means of local exchange service provision is UNE-P. Because Z-Tel is dependent upon the local exchange carrier s UNEs to provide service at this time, Z-Tel has a strong interest in ensuring it receives non-discriminatory service from the ILECs now and in the future. Z-Tel recognizes that the ILECs, including BellSouth, have no interest in providing UNEs in a non-discriminatory manner absent enforcement mechanisms, particularly after receiving 271 relief. One such enforcement mechanism is the subject of this proceeding.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to review and evaluate the basic principles, statistical and economic, related to the development of a Performance Assurance Plan (PAP) for BellSouth Telecommunications Inc. (BellSouth). The discussion of these principles will be within the context of the PAP proposals of BellSouth (VSEEM III), the Joint ALECs (JALECs), and the Florida Public Services Commission's Strawman, as set forth by Paul Stallcup, the Commission s Supervisor of the Economics and Forecasting Section in the Division of Economic Regulation. Mr. Stallcup has made clear, the Strawman is not a specific proposal for a performance plan, but a starting point for the discussion as to what a performance plan should look like.

Q. HAS Z-TEL FILED IN THIS PROCEEDING A PROPOSAL FOR A SPECIFIC PERFORMANCE PLAN?

A. No. Z-Tel supports the basic structure of the JALEC plan as filed. Some changes have been made to that plan very recently, so Z-Tel is not in a position to support the most current version of the plan. Only a small change to the JALEC plan, however, is required to render it a reasonable structure for a performance plan. This change is discussed later in my testimony. This small refinement can be inserted directly into the JLEC plan, or VSEEM III or the Strawman for that matter, without changing the basic structure of the plan. Absent this adjustment, the statistical procedures set forth in both plans and the Strawman are severely defective. In addition to this simple fix to the statistical procedures, substantial alterations to both VSEEM III and the Strawman are required to make those proposals reasonable and effective. Many problems with VSEEM III and the Strawman cannot be repaired.

Q. WHAT IS THE PURPOSE OF THE PERFORMANCE PLAN?

A. The purpose of the performance plan, as noted by Mr. Stallcup, is to encourage BellSouth to provide ALECs access to its OSS at the same level of service BellSouth provides for itself (Stallcup Testimony, p. 3, emphasis added). This same level of service is equivalent to a non-discriminatory or parity level of service. (Stallcup Deposition, p. 15). To incent BellSouth to provide non-discriminatory or parity service, a remedy or penalty is levied in cases where BellSouth provides an ALEC a service level that is of worse quality than it provides itself, or when BellSouth provides service levels non-compliant with established benchmarks.

The same level of service, parity service, and non-discriminatory service are terms frequently used to describe the service-quality goal of the performance plan. The implication is straightforward. If BellSouth provides some service to itself at an average interval of one day, then the ALEC also should

receive service at an average interval of one day. In statistical lingo, the null-hypothesis for parity or non-discrimination is that the difference between the BellSouth and ALEC averages is zero. In principle, only the limitations of the measurement procedure used to assess service quality should allow for deviations from exact parity.

Q. WHY MUST BELLSOUTH BE ENCOURAGED TO PROVIDE NON-DISCRIMINATORY SERVICE?

A. BellSouth must be encouraged to provide non-discriminatory service because BellSouth has powerful incentives to discriminate. Let us not forget that the only reason unbundled elements (UNEs) are provided by BellSouth is because the Telecommunications Act of 1996 requires BellSouth to do so. Further, the provision of UNEs in a non-discriminatory manner likely will promote competition in BellSouth's markets. BellSouth has no incentive to engage in behavior that will reduce its market power.

Q. IF BELLSOUTH HAS NO INCENTIVE TO PROVIDE NON-DISCRIMINATORY SERVICE, THEN WHY HAS IT OFFERED ITS OWN PERFORMANCE PLAN?

A. BellSouth understands that the FCC will likely not approve a 271 application that does not contain a performance plan. Thus, BellSouth must temper its incentive to stifle competition with its desire to satisfy the FCC's demands. If BellSouth acts on its conflicting incentives, then it will offer a plan that just satisfies the FCC's concerns. The FCC's approval of the Texas, Oklahoma, and Kansas 271 applications, and the performance plans included therein, suggests that the FCC's standards for a performance plan are very low. The performance plans that the ILECs included in those applications are

so riddled with statistical and mathematical flaws, that one must wonder whether or not the performance plan carries any weight in the FCC's 271 review process. It is safe to assume that BellSouth has followed the progress of the 271 applications closely. It should come as no surprise, then, that its performance plan is designed more to stifle competition and minimize its liability than to exhibit genuine parity to the FCC. VSEEM III, in my opinion, is a briar patch and BellSouth is the rabbit. I will discuss my view more fully in my testimony.

Q. YOU DO NOT BELIEVE THAT BELLSOUTH'S PLAN CREATES THE CORRECT INCENTIVES FOR IT TO PROVIDE NON-DISCRIMINATORY SERVICE?

A. Aside from the need to satisfy the FCC, which evidently is not very difficult to do with respect to performance plans, BellSouth has an economic incentive not to take measures (such as providing service to ALECs as good as its own retail service) that will reduce its market share. The existence of this disincentive explains at once both the need for an effective performance plan and the weak version of the plan advocated by BellSouth. I believe this Commission should consider BellSouth's incentives, and assign weight to BellSouth's proposals in this proceeding accordingly. I will discuss the specific weaknesses in BellSouth's proposals later in my testimony.

Q. YOU NOTED EARLIER THAT MR. STALLCUP'S VIEW IS THAT THE PERFORMANCE PLAN IS INTENDED TO ENCOURAGE BELLSOUTH TO PROVIDE ALECS ACCESS TO ITS OSS AT THE SAME LEVEL OF SERVICE BELLSOUTH

PROVIDES FOR ITSELF. WHAT METHODS ARE USED TO DETERMINE WHETHER OR NOT THE SERVICE IS PROVIDED TO ALECS AT THE SAME LEVEL OR NOT?

A. There are two types of measures: benchmarks and analogs. Benchmark measures have no retail analog, so standards must be established. For measures defined as benchmarks, the actual performance provided by BellSouth is compared to the benchmark. For example, if BellSouth were required to perform a service within three days 90% of the time, and if the service is provided in three days only 88% of the time, then the service is deemed discriminatory. All parties agree that benchmarks should be treated in a stare and compare manner, so I will not dwell on how benchmarks are treated. Some measures have retail analogs, such as repair intervals. For these measures, a comparison of actual performance levels between BellSouth and the ALEC can be made.

Q. HOW ARE THOSE MEASURES FOR WHICH A RETAIL ANALOG EXISTS EVALUATED AS TO WHETHER THEY CONSTITUTE THE SAME LEVEL OF SERVICE?

A. Interestingly, neither of the proposed performance plans, nor the Strawman, sets forth a methodology that directly tests whether or not service is provided in a non-discriminatory manner (i.e., the same level of service). Rather, the statistical procedures of the Strawman, VSEEM III, and the JALEC plan all assess whether or not the service provided by BellSouth to ALECs is less discriminatory than some specified amount of positive discrimination against the ALEC that each statistical approach assumes to be acceptable. Not surprisingly, the amount of discrimination that BellSouth would deem acceptable is greater than that of the JALEC plan or the Strawman. I will describe the evolution of the statistical approach to performance plans from one that attempts to measure parity to one that forgives the ILEC

for a threshold level of discrimination later in my testimony.

Q. IF THESE STATISTICAL PROCEDURES ARE NOT TESTS OF PARITY, DO YOU BELIEVE THAT THE COMMISSION SHOULD REJECT THESE STATISTICAL PROCEDURES?

A. Not necessarily. The choice of statistical methodology has many implications for the design of the performance plan. Unlike typical statistical analyses, the statistical tests performed in the context of the performance plan directly affect the level of penalty payments BellSouth pays or does not pay. Choosing to test for some level of discrimination that exceeds a threshold, as opposed to testing for the absence of discrimination, may be reasonable if the net benefit of doing so exceeds that of a direct test of parity or discrimination. To determine whether or not a test of discrimination is better than a test of parity, we must evaluate the relative benefits and costs of the two approaches.

Q. DO YOU BELIEVE THAT THE NET BENEFITS OF THE PROPOSALS OF THE PARTIES, AS GIVEN, PASS THE COST-BENEFIT TEST?

A. Absent modification, in my view the statistical procedures proposed in both plans and the Strawman have a flaw that renders them of little value in assessing the presence or absence of discriminatory service. But a very simple adjustment to the statistical technique will remedy the serious flaws in the technique. I will address this remedy later in my testimony. Before I do, I think a review of basic statistical testing is in order.

Q. PLEASE DESCRIBE THE PROCEDURE THAT IS COMMONLY USED TO TEST THE PRESENCE OR ABSENCE OF DISCRIMINATION OR PARITY.

A. The most straightforward method to test for the presence or absence of discrimination, which in the present context is defined to be a difference in the average or mean level of performance between BellSouth and the ALEC, is a means-difference test, often called a z-test. All the plans proposed in this proceeding employ a modification of the standard z-test, called the modified z-test (ModZ). (Bell South's truncated Z is a ModZ to which BellSouth applies additional steps of aggregation. I will comment on this aspect of BellSouth's approach later in my testimony). This particular element of the statistical procedure is not problematic in itself. ModZ is very similar to the simple textbook means-difference test. For convenience, I will focus my attention to the ModZ specification of the means-difference test.

Q. WHAT IS THE MODZ STATISTIC OR TEST?

A. ModZ is a statistic, which is calculated by dividing the difference in the observed average performance level between the ALEC and BellSouth by the standard deviation of the means difference (which equals BellSouth's standard deviation multiplied by the square root of the sum of the inverse sample sizes). The standard deviation is a measurement of how the observations in a sample vary about the sample mean. The ModZ score, then, measures the differences in means in units of standard deviations. Like the standard textbook z-statistic, ModZ is normally distributed with mean zero (i.e., no difference in means) and standard deviation one [ModZ ~ N(0,1)]. More formally, ModZ is computed using

$$ModZ = \frac{X_A - X_B}{s_B \sqrt{\frac{1}{n_B} + \frac{1}{n_A}}} \qquad 0(1)$$

where X_A is the ALEC average level of performance, X_B is BellSouth s average level of performance, s_B is the standard deviation of BellSouth's performance, n_B is BellSouth s sample size, and n_A is the ALEC's sample size. For the specification of ModZ in Equation (1), the implicit null-hypothesis, i.e., the proposition that you are testing, is that the ALEC receives the same level of service that BellSouth receives. In other words, the null-hypothesis is that $X_A = X_B$ (i.e., the means or average are the same) or, equivalently, $X_A - X_B = 0$ (i.e., the difference in the means or averages is zero). All of the variables in Equation (1) are computed monthly by BellSouth and simply need to be plugged into this formula to compute the ModZ.

Q. ONCE COMPUTED, HOW IS THE MODZ USED TO ASSESS WHETHER OR NOT THE SAME LEVEL OF SERVICE HAS BEEN PROVIDED?

A. Once ModZ is computed, a significance level for the statistical test must be chosen. The significance level specifies the certainty with which the researcher can be sure that the two means are indeed different.

Q. PLEASE EXPLAIN.

A. As stated above, ModZ is distributed with mean zero and standard deviation one. However, because the averages (the X s) are computed using samples, not every statistic computed using Equation (1) has a value of zero, even if the BellSouth population and ALEC population are identical. Rather, the z-statistic can take on a variety of values, such as 0.5, 1.5, 2, 3, -0.6, -3, and so forth. To illustrate, Figure 1 of attached Exhibit ___ (GSF-1) shows the histogram for 1,000 random numbers, computed in Excel, that are normally distributed with mean zero and standard deviation one. If 1,000 statistical tests were performed in a single month and the service provided by BellSouth was equal to that of the ALEC, then the ModZ scores computed for those 1,000 tests would follow a distribution almost identical to that in the figure. As illustrated by the figure, ModZ can have a number of values even if the hypothesis is true that the BellSouth and ALEC mean are identical. This distribution of values, despite the fact that service is identical (by assumption), often is referred to as random variation.

Q. CAN YOU PROVIDE AN EXAMPLE?

A. Yes. Assume that BellSouth provides the ALEC with the same level of service it provides itself. Further, assume that the average level of service is three days. If we draw a sample from the ALEC population of service intervals, we would expect that the average of that sample would be three days. However, for any given sample--particularly for smaller samples--the sample average may deviate substantially from three days. For example, we may compute an ALEC average service interval of ten days. From this evidence, we may be inclined to conclude that discriminatory service was provided because ten days is much longer than three days. But, that conclusion would be false because we know, by assumption, that the BellSouth and ALEC populations are identical. Because of the possibility of testing error, it is

necessary to determine whether any observed difference in means is due to an actual difference in service quality or to random variation, which is inherent to the sampling process and particularly pronounced at small sample sizes.

Q. GIVEN RANDOM VARIATION, HOW DO WE KNOW WHEN DISCRIMINATORY SERVICE IS PROVIDED IF WE ARE USING MODZ TO DETECT IT?

A. For a series of coin tosses, we know to expect a fifty-fifty split between heads and tails. What we observe for smaller samples may be different that fifty-fifty, but that does not change our expectation. Similarly, we know what to expect from the ModZ because the distributional properties of ModZ are well known. For example, because we know ModZ has a mean of zero, a standard deviation of one, and its distribution follows the familiar bell-shape of the normal distribution, we can establish that the z-statistic will not exceed 1.65 more than 5% of the time (on average). Nor will the z-statistic be less than -1.65 more than 5% of the time (on average). In other words, we can be about 90% sure that the z-statistic will lie between -1.65 and 1.65 and 95% sure it will be less than 1.65 or greater than -1.65. We can compute these percentages for any chosen value of Modz. For example, the ModZ will exceed 2.35 less than 1% of the time. Likewise, we can compute the ModZ for any chosen percentage. These percentages, the 5% and the 1%, are where we derive the significance level of the statistical test.

It follows from the distribution of ModZ that if BellSouth is providing the ALEC the same level of service it provides itself ($X_A = X_B$), then we will only observe ModZ to exceed 1.65 about 5% of the time. Thus, if we observe a ModZ of 1.70, then we can be 95% certain that the ALEC average level of service is inferior

to BellSouth's average level of service. In statistical lingo, 95% is the confidence level of the statistical test and 5% is the significance (or alpha) level of the test. Notably, the performance plans in Texas, Oklahoma, and Kansas all use this form of a means-difference test, in which they employ a confidence level of 95%, and a significance level of 5%.

Q. PLEASE SUMMARIZE THE USE OF THE MODIFIED Z TEST.

A. If ModZ is greater than or equal to the critical z-score (which is the number of standard deviations associated with the identified significance level), then the conclusion is that average level of service provided to the ALEC is not the same level of service BellSouth provided to itself. Our confidence in this conclusion depends on the significance level of the test, where confidence is equal to one minus the significance level. The significance level of the test is an assumption of the researcher and traditionally is set at the 5% or 1% level. This standard level for significance will be important to my evaluation of the statistical techniques proposed in the performance plans and included in the Strawman.

Q. IF A SIGNIFICANCE LEVEL OF 5% IS USED, ISN'T THERE A 5% CHANCE THAT OUR CONCLUSION IS WRONG?

A. Yes. The possibility of a false positive finding of discrimination is called a Type I error. Type I error equals the significance level of the test, which in this case is 5%. The implications of Type I error are evaluated more readily when a large number of statistical tests are performed. Assume, for example, that 100 statistical tests are performed at a significance level of 5%. If there is no discrimination for all 100 measures we are testing, we will still observe, on average, 5 tests where the ModZ exceeds 1.65. Based on

our chosen statistical methodology, we will conclude that there are 5 instances of discrimination, even though all five are false positives. If penalty payments are based on the statistical finding of discrimination, then we may very well levy penalties when performance is not, in fact, discriminatory.

Q. WHY NOT REDUCE THE SIGNFICANCE LEVEL OF THE TEST TO A POINT WHERE NO FALSE ACCUSATIONS ARE EXPECTED?

A. That can be done. If we increase the significance level of the test to 0.0001, for example, and perform 100 statistical tests, no false accusations will occur. However, this solution to the Type I error has problems of its own. Specifically, by decreasing the significance level of the test, we make it more difficult to reject the null-hypothesis. In other words, we bias the test against a finding of discrimination. The smaller the significance level, the more biased the test is against finding discrimination. The more biased is the test, the less likely we will detect discrimination when it in fact exists. If discrimination exists, but the statistical test fails to detect it, a Type II error has occurred.

Q. SO IT IS POSSIBLE TO OBSERVE BOTH A FALSE FINDING OF DISCRIMINATION AND A FALSE FINDING OF NO DISCRIMINATION?

A. Absolutely, though not simultaneously. Type I and Type II error cannot exist simultaneously because the means cannot differ and equate simultaneously. Nevertheless, two types of errors are possible with statistical testing. Type I error occurs when we falsely conclude there is discrimination when there is none. Type II error occurs when we fail to detect discrimination that actually exists. With Type I error, the ILEC pays penalties for false positives. With Type II error, the ILEC does not pay penalties when it does in fact

discriminate. Both problems need to be addressed within the context of a performance plan.

Q. IF WE CHOOSE A SIGNIFICANCE LEVEL OF 5%, AND KNOW THAT ON AVERAGE 5% OF THE TESTS WILL FALSELY FIND DISCRIMINATION, WHY NOT SIMPLY EXCLUDE 5 FAILURES FOR EVERY 100 TESTS PERFORMED?

A. The Texas PAP resolves the Type I error issue by doing something very close to that idea. In the Texas PAP, a specific number of failed tests is excluded each month based on the presence of Type I error. We typically refer to this as mitigation, because we are mitigating the effects of Type I error. Unfortunately, this resolution to Type I error is more wrong than right. First, this approach ignores Type II error, which is as much a reality as Type I error. Second, the presence of Type I error in Texas is overstated, making the procedures used to compute the number of excluded tests invalid. Because no party to this proceeding has proposed a Texas-style mitigation scheme, I will not dwell on the plethora of problems with the Texas Plan's approach to dealing with statistical error. The problems with the approach incorporated in the Texas Plan, however, led to the development of the statistical technique proposed in both the JALEC and BellSouth plans.

Q. IS IT POSSIBLE FOR A STATISTICAL METHOD, OR MITIGATION METHOD, TO DEAL WITH BOTH TYPE I AND TYPE II ERRORS SIMULTANEOUSLY?

A. Roughly, yes. This task is accomplished with the balancing critical value approach common to the VSEEM III and JALEC Proposals as well as the Strawman. The goal of the balancing procedure is replace the complex and invalid mitigation scheme of the Texas Plan with a provision that neutralizes the impact

of testing errors. Under the balancing critical value approach, mitigation is accomplished by an attempt to equalize Type I and Type II errors. While balancing does not eliminate Type I and Type II errors, the effects of the errors are equalized, at least under the chosen set of assumptions, so that the effects of the errors cancel out. In other words, the net effect of Type I and Type II errors is zero; any overpayment of penalties due to Type I error equals the underpayment of penalties due to Type II error. The consideration of Type II error, if done appropriately, is an improvement over the Texas Plan's mitigation approach. However, incorporating Type II error into a mitigation procedure results in illogical extremes that, unless ameliorated, make the cure worse than the problem it was intended to solve.

Q. HOW ARE TYPE I AND TYPE II ERRORS BALANCED?

A. First, the Type II error rate must be quantified. Once the Type II error rate is computed, we simply set the Type I error rate equal to the Type II error rate. Because the Type I error rate is equal to the significance level of the test, the critical z-score, called the balancing critical value because it presumably balanced Type I and Type II error, is easily computed. The ModZ is then compared to the balancing critical value to determine whether to accept or reject the null hypothesis.

Q. HOW DO WE KNOW HOW MUCH DISCRIMINATION ACTUALLY EXISTS?

A. That's the rub! We do not know. As a practical matter, we do not know where the alternative distribution is. We are forced to make an assumption about the location of the ALEC s distribution relative to BellSouth's distribution. Each of the proposals in this case employs a proxy for the purpose. This assumption often is called the alternative hypothesis. By alternative hypothesis, we mean something other

than the null-hypothesis that, as you will recall, posits that there is no difference in means. By specifying the alternative hypothesis, we can compute the probability that the null hypothesis of no discrimination is accepted despite the fact that the alternative hypothesis (that is, the hypothesis that the means are unequal) is true. The probability of Type II error, often labeled β, is illustrated in Exhibit ___ (GSF-2). The alternative distribution is shifted to the right (if longer intervals are of worse quality) by some assumed increment, called delta (d), of the standard deviation (s_B). This specification of the alternative is identical to that in the statistical procedures of VSEEM III and the JALEC plans. Consequently, delta represents the degree of discrimination that the test deems acceptable. For example, if BellSouth's mean level of service were 3 days, the standard deviation of that service were 6 days, and delta was 1.00 (as BellSouth proposes), then BellSouth could consistently provide the ALEC with service averaging 9 days without any penalty. While not illustrated in Figure 2, it should be apparent that as the difference between the means gets larger (delta gets larger), the Type II error rate gets smaller. Alternately, as the ILEC and ALEC means get closer in magnitude, the Type II error rate increases. Exhibit __ (GSF-3) illustrates the implications of alternative specifications of delta.

Q. WHAT IS A REASONABLE ASSUMPTION ABOUT WHERE THE ALTERNATIVE DISTRIBUTION IS LOCATED?

A. The debate over that question probably will be one of the more contentious in this proceeding. All the proposals specify the location of the alternative distribution in the same manner as I have defined its location in Figure 2. In each, the alternative distribution, or the alternative hypothesis, differs from the BellSouth distribution (the null distribution or null hypothesis) by an amount equal to $\delta \cdot s_B$, or delta times

BellSouth's standard deviation. The delta term, δ, is the most important factor in determining the reasonableness, or the unreasonableness, of the balancing approach. The larger is the delta value, the less likely the statistical procedure will detect discrimination. Furthermore, the larger the delta value, the smaller the sample size at which the balancing approach falls apart. I will discuss this latter issue a bit later.

Q. HOW IS THE VALUE OF DELTA CHOSEN?

A. There is no methodology of which I am aware that allows one to theoretically or empirically determine the value of delta. It is an assumption. In choosing its value, we must consider the reasonableness of its implications for the statistical test for discrimination. We must also recognize that BellSouth wants delta to be very large, because large values of delta allow BellSouth to discriminate against the ALECs without much consequence. Alternately, the ALECs will want delta to be small, because the ALECs want non-discriminatory service. Recall, though, that the function of delta is to create and quantify a scenario that departs from parity. By definition, as delta increases, the scenario of discrimination becomes more severe. By the same token, the smaller is delta, the closer the balancing procedure gets to a true test of parity or non-discrimination. BellSouth has proposed a delta value of 1.00, while the ALECs propose a delta of no more than 0.25. Strictly to frame the debate, the Strawman splits the difference between the maximum value recommended by the ALECs and the value advocated by BellSouth by specifying a delta of 0.50.

Q. PREVIOUSLY YOU MENTIONED THAT THE LARGER THE DELTA VALUE, THE

SMALLER THE SAMPLE SIZE AT WHICH THE BALANCING APPROACH FALLS APART. WILL YOU EXPLAIN THIS STATEMENT?

A. Yes. The balancing critical value ("BCV") can be approximated by the following formula:

$$BCV = \frac{\delta}{2} \cdot \sqrt{n_A}$$

0(2)

where δ and n_A are delta and the ALEC sample size as defined above. As the ALEC sample size increases, the BCV increases. The BCV is the critical value of the hypothesis test, so at larger sample sizes, the test is harder to fail. Furthermore, at larger sample sizes, the Type II error rate gets very small. Because the Type I error rate is set equal to the Type II error rate, the Type I error rate gets very small as well. As I discussed above, a very small Type I error rate biases the test against rejection.

Recall that the standard significance levels of a means-difference test are 5%, or in some cases as low as 1%. A 1% significance level is considered quite small. Rarely are significance levels chosen below this value. The balancing approach, however, produces significance levels much lower than 1%. For example, the mathematical relationships are such that, if δ is 0.50, any measure with a sample size greater than 88 has a significance level smaller than 1%. At a sample size of 1,000, which could easily and frequently occur in the real world, and given a δ of 0.50, the significance level of the test is 0.0000000000000035. In other words, the likelihood of rejecting the null hypothesis is extremely low. (Obviously, if one were to use a δ of 1.00 instead of 0.50, the significance level would be even lower than this absurdly low level.)

Performing a statistical test at this level of significance is unheard of in statistical research because rejection is too difficult. The fact that such values fall out of an approach that is driven by an assumption of delta renders the results no more worthy.

Q. AS YOU DISCUSSED ABOVE, A SIMPLE COMPARISON OF THE SIGNIFICANCE LEVEL OF THE BALANCING APPROACH TO THE MORE STANDARD APPROACH IS MISLEADING. THE BALANCING APPROACH INCORPORATES AN OFFSETTING OF TESTING ERRORS, WHEREAS THE STANDARD APPROACH DOES NOT. IF THIS IS TRUE, HOW DOES THAT AFFECT YOUR ANALYSIS?

A. You will recall that it is possible to choose a significance level so that the effects of Type I error are eliminated. For example, if 500 statistical tests are performed, more parity tests than likely will be performed for any ALEC in a given month, we can be better than 95% sure that no tests will fail due to Type I error at a significance level of 0.0001 or a critical z-score of about 3.73. In other words, even for a very large number of tests, there is no reason to mitigate if a significance level of 0.0001 is used because there is no Type I error problem to mitigate. In other words, there is no reason to mitigate against something that, for practical and theoretical reasons, does not exist. At significance levels less than 0.0001 (assuming no more than 500 tests are conducted), balancing performs no function other than to make it nearly impossible to detect discrimination (i.e., reject the null hypothesis). This implication of balancing is clearly undesirable. Because there is no need to mitigate, there is no need to cripple the effectiveness of the statistical test with unnecessary mitigation procedures.

Q. DOES CHOOSING A LOWER VALUE FOR DELTA RESOLVE THIS PROBLEM?

A. No. The balancing approach is perverse at large sample sizes, regardless of the choice of delta. Smaller deltas only postpone the realization of the perversion, in that the unreasonably small significance levels occur at relatively larger sample sizes. Larger delta values, either 0.50 or 1.00, produce insanely low significance levels at relatively small sample sizes. For example, if the significance level of the balancing approach the test is 0.0001, and delta is 1.00, Type I and Type II error will have no impact even for 500 tests, if the sample size is 55. With a delta of 0.50 the errors would have no impact at a sample size of 222. At a sample size of 100, which is not very large, the balancing critical value with a delta of 1.000 has a significance level of 0.00000134. With a delta of 0.25, the significance level of 0.0001 is reached at a sample size of 890.

Q. HOW DO YOU PROPOSE TO FIX THIS FLAW IN THE BALANCING APPROACH?

A. The easiest way is simply to establish a maximum value (or floor depending on the definition of ModZ) for the critical z-score. For example, the balancing critical value that results from the assumptions is used as long as Type I and Type II errors are relevant to the performance plan. Once the prospect of paying or not paying a penalty based solely on the errors inherent to the statistical tool is zero, then a fixed critical value is used. The critical value of 3.73 developed above is probably overly generous for this purpose, because this value is based on the significance level that makes Type I and Type II error irrelevant for as many as 500 statistical tests performed in a single month.

Q. DO YOU HAVE A SPECIFIC RECOMMENDATION FOR A CEILING ON BALANCING CRITICAL VALUE?

A. Relative to the insanely large values that balancing produces in the absence of a ceiling, the value of 3.73, while perhaps too generous, does not look so bad. However, I believe it would be better to fashion an educated guess as to how many statistical tests will be performed per ALEC per month and derive the corresponding significance level that makes Type I and Type II errors irrelevant to the operation of the performance plan. This significance level is computed easily in Excel using the CRITBINOM function. While a bit more complicated, but not much more so, the ceiling can be computed for each ALEC, each month, depending on the number of statistical tests performed for each. My guess is that the statistical packages used by BellSouth to perform the calculations necessary to the balancing approach should be able to perform this calculation without much difficulty. Choosing a single ceiling is less preferable, but is certainly better than letting the balancing critical value increase, and the significance level decrease, without bounds.

Q. IF A CEILING OR FLOOR IS USED, DOES THE CHOICE OF DELTA MATTER?

A. Yes, it matters very much. If a delta of 1.00 is used, then we reach the ceiling at a sample size of 55. If balancing only applies to sample sizes less than 55, then the balancing approach is so trivial to the measurement of performance there is hardly any reason to balance errors. At delta equal to 1.00, we are essentially using a fixed critical value of 3.73 and a very low significance level of 0.0001. At a delta of 0.25, the ceiling is reached at a sample size of 890, allowing the balancing approach to apply across a larger range

of sample sizes.

Q. DOES A CEILING ON THE BALANCING CRITICAL VALUE IMPLY THAT WE ARE USING ONE TECHNIQUE (BALANCING) AT SMALLER SAMPLE SIZES WHERE THE BALANCING CRITICAL VALUE IS LESS THAN THE CEILING, AND ANOTHER TECHNIQUE AT LARGER SAMPLE SIZES WHERE THE BALANCING CRITICAL VALUE IS UNREASONABLY LARGE?

A. Not really. In fact, an equally valid interpretation of the ceiling is that we continue to balance at large sample sizes, but we balance at smaller delta values. Looking back to Equation (2), we see that for any given delta (δ) value, an increase in the ALEC sample size will increase the balancing critical value (BCV). Alternately, if we hold the BCV constant at the ceiling and increase ALEC sample size, then delta (δ) must be declining in sample size. Exhibit ___ (GSF-4) illustrates the implicit values of delta when a ceiling is used. For the illustration, I assume an initial delta value of 0.25.

Q. SHOULD DELTA BE RELATED TO SAMPLE SIZE?

A. Yes, for at least two reasons. First, as sample size increases, the quality of the estimates of the BellSouth and ALEC means is improved. Because of the quality of the estimates is improved at large sample sizes, a standard statistical test of parity, such as ModZ, becomes more sensitive as sample size increases. A review of Equation (1) confirms the relationship between the ModZ and sample size. The balancing approach, alternately, does not become more sensitive to discrimination as sample size increases. The better information available at large sample sizes is discarded by the balancing approach. This fact is

shown in Exhibit ___ (GSF-3), where the detection limits of the statistical test are illustrated.

Second, if an ALEC has large sample sizes, the odds are that the ALEC has received non-discriminatory or only mildly discriminatory service. Large sample sizes require large customer bases. Large customer bases are not acquired by providing relatively poor service. Thus, if we observe large ALEC sample sizes, chances are that the alternative distribution is very close to BellSouth's distribution--implying that delta is small.

Q. IF THE CEILING ON THE BALANCING CRITICAL VALUE IS ADDED TO THE JALEC PLAN, DO YOU SUPPORT THAT PLAN?

A. Yes. I believe the JALEC plan, with a ceiling on the balancing critical value to repair a major defect of the balancing approach, is a reasonable structure for a performance plan. The lower value of delta proposed by the JALEC plan does not, as discussed earlier, alleviate entirely the fundamental flaw in the balancing approach. At sample sizes larger than 890, the Type I and Type II error rates become too small to affect penalty payments due to error, but small enough to make the detection of discrimination extremely difficult. Later in my testimony I will discuss why I prefer the penalty elements of the JALEC plan to those of VSEEM III and the Strawman.

Q. DO YOU HAVE ANOTHER APPROACH TO SOLVING THE SAMPLE SIZE PERVERSION OF THE BALANCING APPROACH?

A. Yes. This second approach is a bit more complicated than the ceiling, but I believe it represents more of a compromise between the positions of the various parties. This alternative approach specifies the delta

value as a function of ALEC sample size. For reasons discussed above, allowing delta to get smaller with larger sample sizes is reasonable.

Q. HOW DO YOU PROPOSE TO MAKE DELTA A FUNCTION OF SAMPLE SIZE?

A. The specific formula I propose, which I refer to as the delta function, is

$$\delta = \left(K / n_A^2\right)^d \qquad (3)$$

where K is a constant, n_A is ALEC sample size, and d is the decay parameter. The decay parameter (d) determines how quickly the delta value falls with sample size. Once d is specified, K is adjusted so that the formula produces the maximum delta value desired. I propose that K equal 4.00 and d equal 0.155. This specification of Equation (3) produces a maximum delta value of 1.00, as recommended by BellSouth, and a delta value of 0.051 at a sample size of 30,000. The minimum delta for any plausible sample size is about 0.05. The maximum delta value proposed by the JALECs, 0.25, occurs at a sample size of 175. The balancing critical value does not exceed 4.00 until a sample size of about 18,000 and does not exceed 5 even at a sample size of 50,000. While these larger balancing critical values exceed the generous ceiling of 3.73, exceeding the ceiling is perhaps a reasonable tradeoff when considering that all of the proposed delta values can be incorporated into the plan (i.e., 1.00, 0.50, and 0.25 and less).

Q. DO YOU THINK THE CEILING OR THE DELTA FUNCTION IS A BETTER WAY TO REPAIR THE DEFECTS IN THE BALANCING CRITICAL VALUE APPROACH?

A. The ceiling is more straightforward and easier to implement, but the delta function allows all of the proposed delta values to be incorporated into the final plan. The large delta values proposed by BellSouth are used at small samples, while smaller delta values are used at larger sample sizes. Additionally, the delta function can produce balancing critical values with significance levels below that point where Type I and Type II errors become irrelevant, but only at very large sample sizes. There are benefits to each approach. One can make a good case for either. What is obvious, however, is that something must be done to fix the significance level problem of the balancing critical value approach.

Q. LET'S MOVE ON THE PENALTY ELEMENTS OF THE PLANS. ARE MEASURE-BASED OR TRANSACTION-BASED PENALTY MECHANISMS PREFERABLE?

A. For a number of reasons, the measure-based approach is more reasonable than a transaction-based penalty mechanism. First, and most obviously, it is impossible to measure the number of transactions when statistical procedures are used to detect discrimination. Certainly, the computations of VSEEM III and the Strawman have nothing to do with the number of transactions. BellSouth's approach of subtracting a critical z-score from the ModZ, and dividing by four, is not a measure of occurrences of discrimination. It cannot measure the number of transactions except by pure accident (having a probability of $1/\infty$). Consider an ALEC with 100 orders in one month. Assume that BellSouth provides service to all of its customers in one day, and assume that 90 of the ALEC customers get service in 1 day and 10 get service in 5 days. The average level of service for the ALEC is 1.4 days. The z-statistic for this level of service is about 4.00 and

the balancing critical value is about 1.25, for a parity gap of 0.6875. Note that only 10% of the ALEC customers were discriminated against, but the VSEEM III (and Strawman) calculation indicates that about 69% of the ALEC customers were discriminated against. Now, consider a case where all 100 ALEC customers get service in 1.4 days. The ModZ, balancing z-score, and the parity gap are identical to those just computed for the other example. Clearly, the parity gap of VSEEM III and the Strawman do not measure occurrences. Because these two examples of discrimination are probably very different in their impact on competition, it is odd that the parity gap finds no difference between the two widely disparate forms of discrimination.

That the VSEEM III procedure cannot measure transactions is made most obvious by the fact that VSEEM III (and the Strawman) propose to truncate the parity gap at 100%. If the parity gap indeed measured transactions, then by definition, the parity gap could not exceed 100%. The fact that the parity gap can exceed 100% proves that the parity gap does not and cannot count transactions. If the parity gap is some index of transactions and severity, then there is no reason to truncate the gap at 100%, since 100% of the customers can experience discrimination of varying degrees. The parity gap calculation makes no sense.

Finally, if the parity gap did measure transactions, then it could not also measure the severity of the discrimination. If the parity gap measures severity, then it cannot measure transactions. As shown with the numerical example above, the parity gap fails to capture either severity or transactions. Again, the parity gap calculation makes no sense.

Q. IF THE PARITY GAP DOES NOT MEASURE OCCURRENCES, OR MEASURE SEVERITY, WHAT DOES THE PARITY GAP MEASURE?

A. One-quarter of the difference between ModZ and the balancing critical value: nothing more, nothing less.

Q. YOU HAVE OFFERED A FIX FOR THE FLAW IN THE BALANCING CRITICAL VALUE APPROACH. DO YOU HAVE A REMEDY FOR THE PROBLEM WITH THE TRANSACTIONS-BASED PENALTY MECHANISM?

A. No. It is not possible to measure two very different things--the number of discriminatory transactions and the severity of the discrimination for those transactions--with a single measurement tool like the parity gap. Even if the VSEEM III procedure could measure the number of transactions, which it cannot, it could not simultaneously measure the severity of discrimination for those transactions. Any procedure like the parity gap that counts occurrences of discrimination cannot, at the same time, measure the severity of the discrimination.

Q. WHAT ARE SOME THE BENEFITS OF A MEASURE-BASED PENALTY SYSTEM RELATIVE TO A TRANSACTIONS-BASED SYSTEM?

A. Perhaps the most important benefit of the measure-based system is that it coincides closely with the discriminatory behavior that we are attempting to control with the performance plan. In my view, BellSouth makes the decision as to whether or not to provide parity of service, not the number of orders to which it will provide that service. In other words, BellSouth decides to provide a lesser quality of service to the

ALEC, but does not choose to discriminate against customers 1, 5, 9, and 150 as opposed to customers 2, 8, 88, and 101. This latter view of discrimination--inherent to the transaction approach--seems a bit far-fetched.

As conceptualized in the delta parameter, if the decision to discriminate is made it is not true that all orders will receive discriminatory service. I believe the decision BellSouth makes is how hard it will work to provide parity service, which is conceptually equivalent to the choice of what delta, i.e., the alternative distribution, will be. The entire ALEC distribution shifts away from parity, allowing some customers to receive an acceptable level of service while others receive discriminatory service. The decision, irrespective of the number of consumers receiving discriminatory service, is to provide discriminatory service. The penalty should focus on that decision. The measure-based system does so, whereas the transaction-based system does not. In common parlance, the measure-based system is a treatment of the disease; the transaction-based system is a treatment of the symptoms alone.

DOES THE MEASURE-BASED SYSTEM INCORPORATE A REASONABLE MEASURE OF DISCRIMINATION?

Yes. In effect, the measure-based system, as specified in the JALEC plan, levies a penalty commensurate with the presence of disparate service. The ratio of the ModZ to the balancing z-score equals the means difference divided by some factor of the standard deviation. For example, at a delta of 0.25, the ratio of ModZ/z* equals $(X_A \quad X_B)/0.5 \cdot \delta \cdot s_B$. Note that this ratio is not a function of sample size, but equals the observed means difference divided by some increment of the observed standard deviation. In my view,

this ratio of Z-scores is a satisfactory index of discrimination.

Because the ModZ is a function of sample size (see Equation (1)), it is inappropriate to base penalties on ModZ alone, as we are unable to determine whether or not an actual means difference or sample size is to blame for the size of ModZ. The JALEC proposal eliminates this concern and truly, unlike the transaction-based system, bases the penalty on the degree of discrimination rather than a mix of discrimination and other factors.

The transaction-based approach has none of these desirable properties. Exactly what the parity gap does measure is unclear, particularly after the truncation procedures, but it does not appear to be a reliable measure of either transactions or severity. Unlike the ratio of Z-scores, the difference between ModZ and the BCV is a function of sample size, making it difficult to assess whether discrimination is discrimination or just differences based on sample size. Further, the transaction-based penalties do not appear to be as easily computed as the measure-based system. As noted in my earlier filings in this proceeding, I have attempted to replicate the examples provided in the Strawman, (examples provided to the Staff by BellSouth), but have been unable to do so. The computations for the truncated z-score are very complex, so it is possible that my attempt to replicate them is flawed. I find it hard to fathom how a balancing critical value of 0.21, which is the balancing critical value in the examples provided in the Strawman, can be correct, inasmuch as it is roughly equivalent to the balancing critical value associated with a sample size of 0.71 at a delta of 0.50. Even if the numbers are right, the inability to replicate the calculations easily suggests the truncated z-score approach may be too complicated for a performance

plan. If the ALECs, or the Commission, cannot check BellSouth s math, then BellSouth will be able to avoid penalty payments and discriminate without restraint.

Q. IS THE MEASURE-BASED SYSTEM FLEXIBLE?

A. Yes. The flexibility of the measure-based system is another one of its benefits. The measure-based payment function of the JALEC plan is linearly homogeneous. This means that when you multiply the function by a number, that number adjusts the minimum and maximum penalty, as well as the penalties in between. If you wanted to double the penalties the function produces, just multiply the function by 2. If you want to reduce the penalties by 20%, multiply the function by 0.80.

The simple formulation of the penalty formula in the JALEC plan allows the penalties produced by the function to be changed without much difficulty, giving the Commission flexibility as to the selection of penalties. Furthermore, as we learn more about the effectiveness of various penalties, we likely will want to make some adjustments to penalty levels. Such adjustments are very easy in the context of the measure-based system proposed in the JALEC plan.

Q. DO YOU SUPPORT THE QUADRATIC PENALTY FUNCTION OF JALEC PLAN?

A. I think the quadratic penalty function of the JALEC plan is a reasonable specification of the penalty calculation. My support, however, does not preclude the use of other functional forms and/or different parameters for the penalty function. I do believe that the ratio of ModZ and the balancing z-score is very good index of discriminatory service. There are many ways in which to convert that index of discrimination into penalty payments. If the Commission does not like the JALEC quadratic function,

then the Commission should not reject measure-based approach for this reason. Other functions can be specified that do meet the Commission's requirements.

Q. DO YOU SUPPORT THE USE OF THE TRUNCATED Z-SCORE?

A. No. I do not think that aggregating up to the state level is necessary. If the statistical analysis is going to be performed at the cell level, then perform the statistical analysis at the cell level. Because I have been unable to replicate the examples of the truncated z-score, it is difficult to say what effect it has on the ability of the statistical procedures to detect discrimination. The fact that the computations cannot be easily replicated is sufficient reason to question the usefulness of the procedure.

BellSouth's desire to aggregate is perhaps motivated by its desire to weaken the test of discrimination. As discussed earlier, the balancing critical value gets larger as sample size increases, thus making a finding of discrimination more difficult. BellSouth, therefore, benefits from aggregation, in that the test of discrimination is weakened. At the delta values proposed in VSEEM III and the Strawman, a little aggregation can reduce substantially the test s ability to detect discrimination. The desire to aggregate the data is illustrated in Exhibit ___ (GSF-5). At small sample sizes, the balancing approach is a stricter test of discrimination than the standard statistical test. At larger sample sizes, the balancing approach is a less strict test of discrimination than the standard statistical test.

Q. HOW DOES THE MEASURE-BASED APPROACH TREAT ALECS OF DIFFERENT SIZES?

A. All ALECs are treated the same under the measure-based system. The transaction-based system

discriminates against smaller ALECs. For example, assume that ALEC A has 5,000 orders and ALEC B has 50 orders. With a transaction-based penalty approach, BellSouth clearly will favor ALEC A because of its relatively large sample size. The expected total payment for a $100 penalty per transaction applied to ALEC A s 5,000 orders is much greater than the expected payment for ALEC B s 50 orders. The per transaction penalty for ALEC B would need to be increased by 100 times (to $10,000 per transaction) to equalize the effect of discrimination across the two ALECs.

Recall that Section 251(c)(2)(C) of the Telecommunications Act requires that BellSouth provide service "at least equal in quality to that provided by the local exchange carrier to itself or to any subsidiary, affiliate, or any other party to which the carrier provides interconnection." Thus, a performance plan that, by design, is biased against particular ALECs simply because of their size runs the risk of violating Section 251 of the Act by allowing quality to vary between the other part[ies] to which the carrier provides interconnection, --i.e., the ALECs. Thus, an additional benefit of the measure-based system is the non-discriminatory treatment of smaller ALECs, which is both equitable and required by Section 251(c)(2)(C) of the Telecommunications Act of 1996.

Q. DO YOU RECOMMEND AN ABSOLUTE CAP ON BELLSOUTH S LIABILITY?

A. No. Absolute caps are detrimental to the effectiveness of the performance plan. Once the cap is reached, there is no counter-incentive to BellSouth s desire to discriminate and impede competition.

Q. DO YOU RECOMMEND A PROCEDURAL CAP?

A. A procedural cap is a reasonable element for a performance plan. I concur with Mr. Stallcup that 39%

of net revenue is a reasonable level for a procedural cap. The relationship of total penalty payments to the cap should be done on a rolling 12-month basis. Table 1 of Exhibit ___ (GSF-6) illustrates the computations for the cap of $337 million.

Q. DO YOU HAVE ANY CONCLUDING COMMENTS?

A. Yes. I would just like to encourage the Commission to treat the performance plan with the seriousness it deserves. I do not believe that some other state commissions have done so. If and when BellSouth receives 271 authority, the performance plan will be the first line of defense against an attack on the competition we have worked so hard to produce. All other defenses are time consuming and expensive and do not serve the interest of consumers. Z-Tel believes that the performance plan is one of the most important regulatory issues being evaluated at this time.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

FPSC Docket No. 000121-TP
Witness: George S. Ford
Exhibit No. _____ (GSF-1)

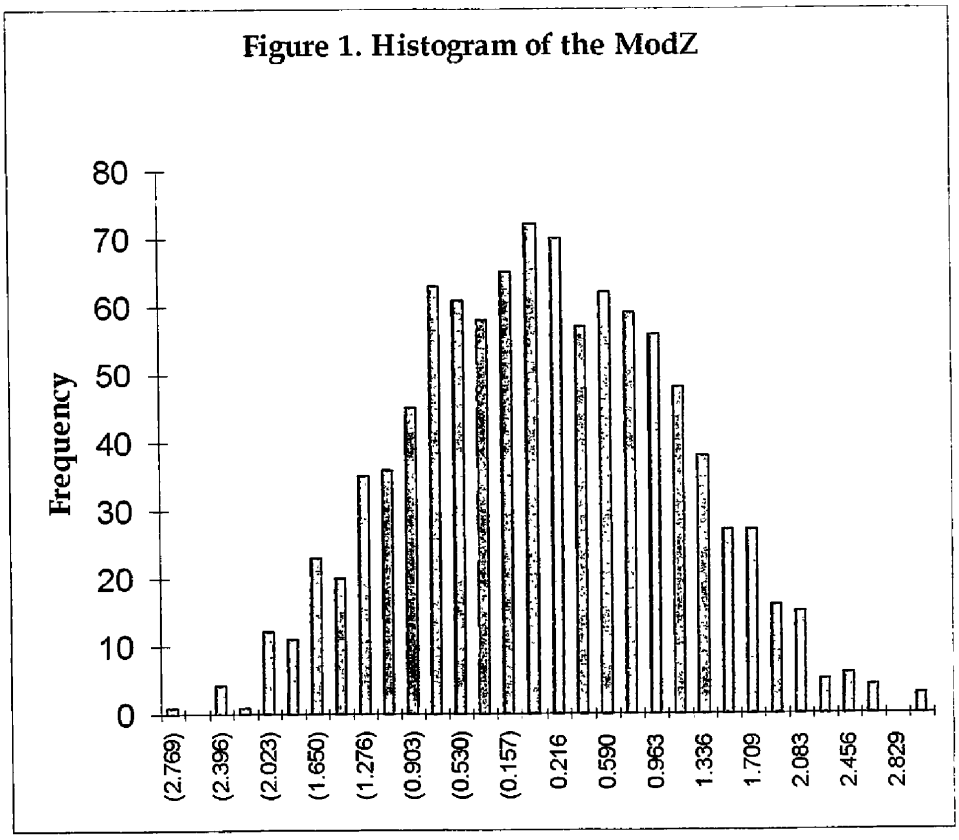


Figure 2. Type II Error at the 5% Significance Level with an Alternative Distribution with Mean $X_B + \delta \cdot s_B$

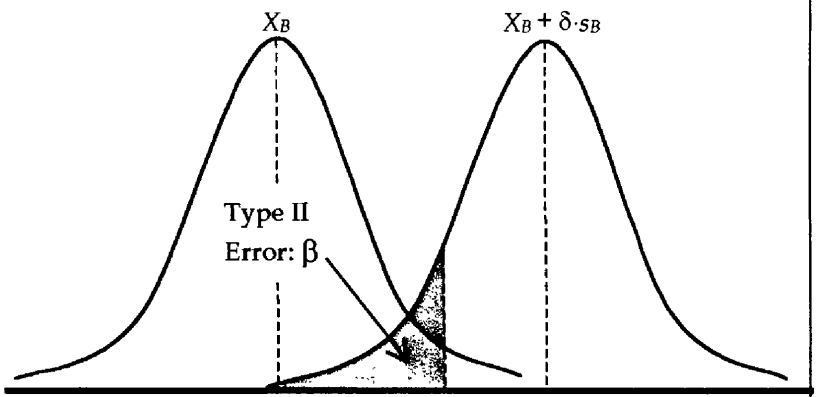


Figure 3. Location of the Alternative Distribution with Different Delta Values

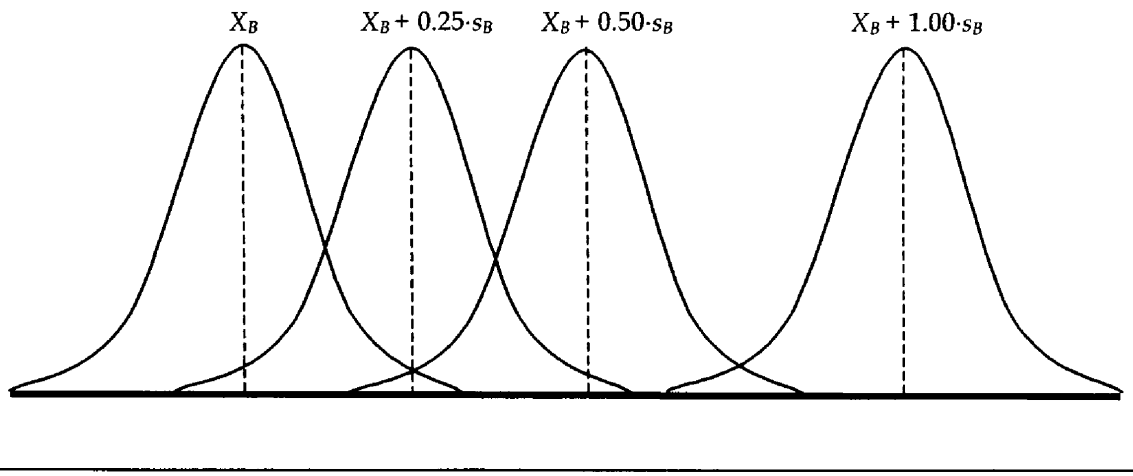


Figure 4. The Implicit Delta Value With a BCV Ceiling

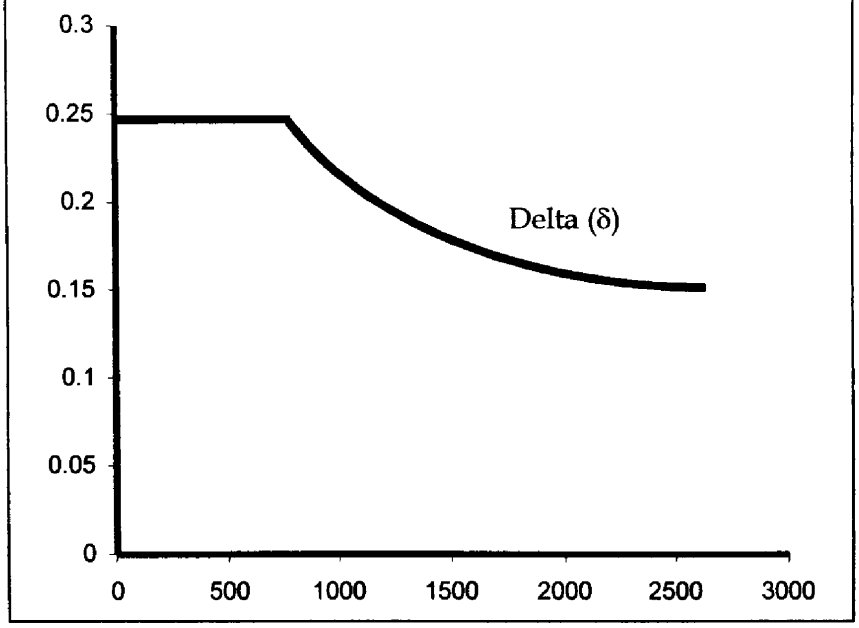


Figure 5. Allowable ALEC Means

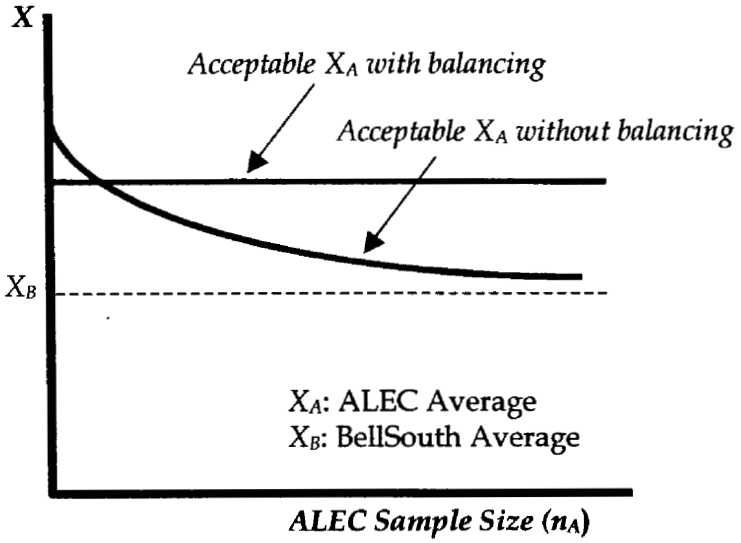


Table 1. Data for Florida from ARMIS 43-01 (1999)

(Downloaded from FCC Web Site: http://www.fcc.gov/ccb/armis/)

Year	Company Name	Row_#	Row_Title	Total_b	State_g	Interstate_h
1999	BellSouth	1090	Total Operating Revenues	4,211,854	2,876,616	1,074,227
1999	BellSouth	1190	Total Operating Expenses	2,743,616	1,785,836	649,943
1999	BellSouth	1290	Other Operating Income/Losses	-2,071	-1,534	-520
1999	BellSouth	1390	Total Non-operating Items (Exp)	373,725	8,819	-905
1999	BellSouth	1490	Total Other Taxes	259,794	199,244	59,871
1999	BellSouth	1590	Federal Income Taxes (Exp)	361,807	268,010	113,841
1999	BellSouth	1915	Net Return	N/A	N/A	250,957
1998	BellSouth		Access Lines (ARMIS 43-08)	6,551,570		

FCC's Net Return Calculation*

		Net Return	39% Net Return
BellSouth	"Net Return"	864,130	337,011

*Calculations in testimony based on FCC NY 271 Order at ft. 1332: "To arrive at a total "Net Return" figure that reflects both interstate and intrastate portions of revenue derived from local exchange service, we combined line 1915 (the interstate "Net Return" line) with a computed net intrastate return number (total intrastate operating revenues and other operating income, less operating expenses, non-operating items and all taxes)." Following the FCC's guidelines, the 'Net Return' is [250957+2876616+-1534 - (1785836+8819+199244+268010)]= $864130.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the (Revised) Direct Testimony of George S. Ford has been furnished by hand delivery(*), facsimile (**) or U.S. mail on this 2nd day of March, 2001 to:

(*)Tim Vaccaro
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

(*)Marsha Rule
AT&T
101 North Monroe Street, Suite 700
Tallahassee, Florida 32301-1549

(*)Nancy B. White
c/o Nancy H. Sims
BellSouth Telecommunications, Inc.
150 South Monroe Street, Suite 400
Tallahassee, FL 32301-1556

Nanette Edwards
ITC Deltacom
4092 South Memorial Parkway
Huntsville, AL 35802

(*)Patrick Wiggins/Charles J. Pellegrini
Katz, Kutter, Haigler, Alderman,
Bryant & Yon, P.A.
Post Office Box 1877
Tallahassee, Florida 32302

Catherine Boone
Covad Communications Company
Ten Glenlake Parkway
Suite 650
Atlanta, Georgia 30328

(*)Floyd Self
Messer, Caparello & Self, P.A.
215 South Monroe Street, Suite 701
Tallahassee, Florida 32302-1876

Rodney L. Joyce
Shook, Hardy & Bacon, LLP
600 14th Street, N.W.
Suite 800
Washington, D.C. 20005-2005

(*)Michael A. Gross
Florida Cable Telecommunications
Association
246 E. 6th Avenue
Tallahassee, FL 32303

(**)Kimberly Caswell
GTE Florida Incorporated
Post Office Box 110, FLTC0007
Tampa, Florida 33601-0110

Scott A. Sapperstein
Intermedia Communications, Inc.
3625 Queen Palm Drive

(*)Jeffrey Wahlen
Ausley Law Firm
Post Office Box 391

Tampa, Florida 33619-1309
Donna Canzano McNulty
MCI WorldCom, Inc.
325 John Knox Road
The Atrium Building, Suite 105
Tallahassee, Florida 32303

Tallahassee, Florida 32301
Glenn Harris
North Point Communications, Inc.
222 Sutter Street, 7th Floor
San Francisco, CA 94108

(*)Kenneth Hoffman/John Ellis
Rutledge Law Firm
Post Office Box 551
Tallahassee, Florida 32302

(*)Peter Dunbar/Karen Camechis
Pennington, Moore, Wilkinson, Bell &
Dunbar, P.A.
Post Office Box 10095
Tallahassee, Florida 32302

Andrew Isar
Telecommunications Resellers Assoc.
4312 92nd Avenue, N.W.
Gig Harbor, WA 98335

Laura L. Gallagher
Laura L. Gallagher, P.A.
101 East College Avenue, Suite 302
Tallahassee, Florida 32301

(*)Charles J. Rehwinkel/Susan Masterton
Sprint-Florida, Incorporated
P.O. Box 2214
Tallahassee, FL 32316-2214

(*)Angela Green, General Counsel
Florida Public Telecommunications Assoc.
125 S. Gadsden Street, Suite 200
Tallahassee, Florida 32301-1525

John Kerkorian
5607 Glenridge Drive
Suite 310
Atlanta, Georgia 30342

(*)Bruce May
Holland Law Firm
Post Office Drawer 810
Tallahassee, Florida 32302

Mark E. Buechele
Koger Center
Ellis Building
Suite 200
1311 Executive Center Drive
Tallahassee, Florida 32301-5027

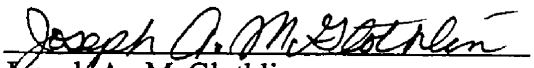
Jonathan E. Canis
Michael B. Hazzard
Kelly Drye & Warren, LLP
1200 19th Street, NW, Fifth Floor
Washington, D.C. 20036

(*) Lisa Harvey
Florida Public Service Commission
2540 Shumard Oak Boulevard
Gunter Building, Room 235-D
Tallahassee, Florida 32399-0850

Stephen P. Bowen
Blumfield & Cohen
4 Embarcadero Center, Suite 1170
San Franciso, CA 94111

Monica M. Barone, Director
State Regulation
Birch Telecom of the South, Inc.
8601 Six Forks Road, Suite 463
Raleigh, NC 27516

(*)Norman H. Horton, Jr.
Messer, Caparello & Self, P.A.
215 S. Monroe Street, Suite 701
Tallahassee, Florida 32301-1876



Joseph A. McGlothlin
McWhirter, Reeves, McGlothlin, Davidson,
Decker, Kaufman, Arnold & Steen, P.A.
117 South Gadsden Street
Tallahassee, Florida 32301
(850) 222-2525 Telephone
(850) 222-5606 Telefax

Attorneys for Z-Tel Communications, Inc.