

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554**

In the Matter of)
)
Joint Application by BellSouth Corporation,)
BellSouth Telecommunications, Inc.,) CC Docket No. 02-35
and BellSouth Long Distance, Inc. for)
Provision of In-Region, InterLATA)
Services in Georgia and Louisiana)

SUPPLEMENTAL REPLY AFFIDAVIT OF KEITH E. JOHNSON, PH.D.

I, Keith E. Johnson, being of lawful age and duly sworn upon my oath, hereby depose and state:

I. PROFESSIONAL EXPERIENCE

1. My name is Keith E. Johnson. My business address is 3535 Colonnade Pkwy., Birmingham, AL 35243. I am a Statistician for BellSouth Telecommunications, Inc. I have a Bachelor of Science degree in Mathematics from The University of Wisconsin – Stevens Point, a Master of Science degree in Mathematics from The University of Wisconsin – Madison and a Ph.D. in Mathematics from the University of Georgia. I am certified by the American Society for Quality (ASQ) as a Quality Engineer (CQE) and as a Six Sigma Black Belt (CSSBB). I have over 28 years experience in telecommunications data analysis.

II. PURPOSE OF THE AFFIDAVIT

2. The purpose of my reply comments is to respond to certain statistical issues raised in the Supplemental Declaration of Robert M. Bell and the Joint Supplemental Declaration of Cheryl Bursh and Sharon Norris on behalf of AT&T Corp. See Supplemental Comments of AT&T Corp. In Response To BellSouth Corporation’s Supplemental Brief, *Joint Application by BellSouth Corporation, BellSouth Telecommunications, Inc. and BellSouth Long Distance,*

Inc., for Provision of In-Region, InterLATA Services in Georgia and Louisiana, CC Docket No. 02-35 (FCC file Mar. 4, 2002). In responding to these declarations, I address the following issues: BellSouth's revised sampling methodology for Service Order Accuracy; the replacement of state specific results with regional results; and reduced sample sizes for certain sub-metrics.

III. BELLSOUTH'S REVISED SAMPLING METHODOLOGY

3. Dr. Bell complains about the alleged lack of details concerning BellSouth's revised Service Order Accuracy (SOA) sampling methodology. AT&T Bell Supp. Decl. ¶¶ 3-4. Under the old sampling methodology, sampling was done by Local Service Requests (LSRs). Each Service Order (SO) in a sampled LSR was examined for errors, and an error on any SO within that LSR resulted in scoring that LSR as being in error. By contrast, the revised sampling plan randomly samples the SOs directly for each sub-metric with no consideration of stratification of the total universe of SOs. Because the sampling frame for each sub-metric consists of all SOs generated for that sub-metric for a given month, more than one service order from a given LSR could be chosen in a sample. If an LSR consists of 10 SOs, it is 10 times more likely that one of those SOs will be included in the sample than a SO from an LSR that has only that one SO. Theoretically, all 10 SOs from the aforementioned LSR could be part of the sample, although this is quite unlikely. Since the stated intent of the measurement is Service Order Accuracy and since the Service Quality Measurement (SQM) plan requires a "statistically valid sample of service orders," sampling SOs directly makes more sense and is more consistent with the SQM than sampling LSRs.
4. Sample sizes are chosen for each sub-metric with a target of a 95% confidence interval of 5% or less. That is, we hope to be 95% certain that the error rate for the universe being sampled is no further than 5% from the sample error rate. Scenario testing with the Hypergeometric distribution (see Supp. Reply Exhibit KEJ-1) using error rates slightly greater than the historical tendency

helps assure that the final result will be statistically valid at this level. When the sampled SOs have been checked for errors, the Hypergeometric distribution is used to calculate the actual confidence limits.

5. An unordered sample of 150% of the prescribed size is generated from SO records using computer generated random numbers. That is, the first SO on the list is the first one randomly selected, the second SO on the list is the second one randomly selected, etc. The reviewers begin with the first SO on the list and attempt to retrieve it for analysis. Should it be unavailable they proceed to the next designated SO and continue until they have been able to locate, in order, the prescribed number of SOs for the sample. By maintaining the list in the order in which they were selected the randomness of the selections is insured.

IV. SAMPLE SIZE ISSUES

6. Ms. Bursh and Ms. Norris contend that by using the previous methodology a sample of 20 LSRs would, with an average of 2 SOs per LSR, involve a review of 40 SOs, while a sample of 20 SOs under the current methodology would only involve reviewing those 20 SOs. AT&T Bursh & Norris Supp. Decl. ¶ 113. Since under the previous methodology the sampling frame was LSRs, all sample sizes, error rates, and sampling precisions were calculated using LSR counts. Under the current methodology, the sampling frame is SOs and statistically valid sampling techniques are being applied to the universe of SOs. Hence any comparison of SOs examined under the previous methodology to SOs sampled and examined under the current methodology is irrelevant. The only question that should be asked is whether the samples yield a statistically significant answer.
7. Dr. Bell raises a concern about reduced sample sizes in December 2001. AT&T Bell Supp. Decl. ¶ 7. Although the December results were based on reduced sample sizes for some sub-metrics, sample sizes have been significantly increased in subsequent months as more history

became available and appropriate sample sizes could be calculated more reliably. The most recent month for which sample sizes were assigned has no sample sizes smaller than 100.

8. Dr. Bell asks whether BellSouth chose smaller sample sizes to mask subpar service. This sentiment is echoed in Bursh and Norris. AT&T Bell Supp. Decl. ¶ 7, AT&T Bursh & Norris Supp. Decl. ¶ 110. As evidence that BellSouth did not choose sample sizes in such a way as to intentionally mask poor performance, consider that for a universe of 5000 SOs with an overall error rate of 2% (100 errors) a sample of 35 would be slightly more likely to overstate the error rate than to understate it (probability of overstatement = 0.508; probability of understatement = 0.492). Using the same parameters for the universe, a sample twice as large (70) would be more likely to understate the error rate for the universe (probability of overstatement = 0.410; probability of understatement = 0.590). Of course the larger sample size is still to be preferred because it yields a tighter confidence interval.
9. Dr. Bell points out that if all 600 SOs were examined for A.2.25.2.1.1 instead of the 40 that were examined the sub-metric might have failed. AT&T Bell Supp. Decl. ¶¶ 7-8. Since sampling statistics can only approximate the parameters of the measured universe, this is always true, regardless of the size of the universe or the size of the sample. The unexamined portion of the universe might harbor many SOs that were in error or it might be virtually error free. The objective is to sample in such a way as to minimize manpower requirements while delivering an answer that is statistically reliable.

V. REGIONAL VS STATE RESULTS

10. Dr. Bell questions the replacement of state-specific results with regional results. AT&T Bell Supp. Decl. ¶ 5. The nine-state aggregate approach replaces the state-specific approach that was being used in Georgia and the three-state aggregate approach (Georgia, Florida and

Kentucky) being used in Louisiana. Dr. Bell's concern about this nine-state aggregate approach is unfounded.

11. Since the SOs are generated by two regional Service Centers, trying to establish state specific measures places an artificial constraint on the measure. The Service Representatives in these centers handle orders from all 9 BellSouth served states and there is no reason to believe that SOs for one state would yield a significantly different result than SOs for any other state or for the entire region.
12. The increased volume from a region-wide analysis comes into play in the small and large volume categories differently. In some of the smaller categories where we may have fewer than ten Service Orders per state, a more meaningful answer is obtained by looking at these categories region-wide. These categories are too small to sample and are censused (all available Service Orders are examined). However, if each state had 5 Service Orders for a regional total of 45, a single incorrect Service Order would result in a 20% error rate (1 out of 5) in the state for which it occurred while the other states would luxuriate in a 0% error rate. Region-wide we would be looking at a more meaningful answer of 1 error in 45 for an error rate of 2.2%.
13. By sampling region-wide in the larger categories we gain by economies of scale. Sample sizes are not related linearly to the size of the universe being sampled. That is, a universe of 2000 will not require a sample size twice that required for a universe of 1000 with the same assumed error rate. Using the Hypergeometric distribution to estimate sample sizes and assuming an error rate of approximately 4% with a desired 95% confidence interval of $\pm 5\%$, we have the following (similar results would be achieved for different assumed error rates):

Universe	Required Sample
100	60

500	95
1,000	100
5,000	110
10,000	115
20,000	115
100,000	115

14. Sampling a really large universe state by state with the assumed 4% error rate would require 9 individual samples of 115 each. Sampling region-wide (which is more meaningful since that is how the process operates) requires a single sample of 115. (In actual practice we would choose a sample somewhat larger than 115 to allow for fluctuations in the error rate.)

VI. MISCELLANEOUS SOA ISSUES

15. Ms. Bursh and Ms. Norris lament that “BellSouth has failed to provide any data showing what its service order accuracy rates would have been in November and December under the prior methodology.” AT&T Bursh & Norris Supp. Decl. ¶ 116. Since the current methodology does not examine all SOs in an LSR, such a comparison would be most difficult. BellSouth has, however, redone previous months’ data using the new methodology so that a comparison can be made. This data is contained in the Supplemental Reply Affidavit of Alphonso Varner (Supp. Reply App., Tab I).

16. Ms. Bursh and Ms. Norris contend that more complex service orders are more likely to have errors and that selecting less complex service orders would skew the SO Accuracy measure and would not reflect BellSouth’s actual performance. AT&T Bursh & Norris Supp. Decl. ¶ 114. Although Ms. Bursh and Ms. Norris fail to point it out, the converse is equally true; i.e., selecting only complex SOs for review would likewise skew the results. That is why the sampling is totally

random, so as to obtain a reasonable cross section of the SO universe to best gauge overall accuracy.

VII. CONCLUSION

17. The criticisms of the methodology used by BellSouth to calculate Service Order Accuracy results by Dr. Bell and Ms. Bursh and Ms. Norris are unwarranted. The Service Order Accuracy measurement and the associated methodology used by BellSouth to calculate confidence limits based on the Hypergeometric distribution is a statistically reliable gauge of BellSouth's performance.