Attachment A

CLEC PROPOSED REMEDY PLAN

FOR

ILLINOIS

MARCH 12, 2001

SPONSORED BY:

ASSOCIATION OF COMMUNICATIONS ENTERPRISES, f/k/a
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I. Introduction

The competitive local exchange carriers ("CLECs") in Illinois participating in the Performance Measure Collaboratives have agreed to present the Illinois Commerce Commission ("Commission") with a compromise performance remedy plan. Although each CLEC has its own recommended plan, the parties have determined that the following compromise plan would incorporate those provisions the Commission has ordered, as well as provide the proper remedy for SBC/Ameritech to provide Illinois CLECs with adequate operational support services.

The CLECs intend to offer this plan in Indiana, Michigan, Ohio, and Wisconsin, as well as Illinois. The CLECs believe that a remedy plan must take effect prior to 271 application and approval to enforce SBC/Ameritech's market opening requirements under the Telecommunications Act of 1996, Section 251.

A. Prerequisites for Performance Remedies

In order for a Performance Remedy Plan to be effective, performance measures that establish the minimum acceptable performance reporting requirements must be in place. In Illinois, in Docket No. 98-0555, the Commission ordered SBC/Ameritech to use the SBC Texas performance measures as a starting point The collaborative has been meeting for many months, and in conjunction with progress in other state collaboratives, an agreement on the measures has occurred. In a joint motion filed with the Commission on February 5, 2001 SBC/Ameritech and the CLEC participants in Docket No. 01-0120 proposed final baseline performance measurements to be used in SBC/Ameritech's OSS 3rd Party Test.[1]

[1] The CLECs agree that this should be the initial measurement to be used in the remedy plan. Additionally, Time Warner Telecom advocates that equivalent high capacity services (also known as special access services) be included in the performance measurements and associated remedies. If performance measurements for special access services and any associated penalties were included for in the remedy plan, it would specifically meet the Commission's principle that requires that a remedy plan not discriminate against CLECs based on their mode of entry.

B. General Principles

The FCC highlighted in its first approval of a 271 application (Bell Atlantic-New York) general principles for a successful performance remedy plan. The CLEC's compromise plan embraces the FCC's pillars of an effective remedy. Such a plan must include:

- Potential liability that provides a meaningful and significant remedy to comply with the designated performance standards;
- Clearly-articulated, pre-determined measures and standards, which encompass a comprehensive range of carrier-to-carrier performance;
- A reasonable structure that is designed to detect and sanction poor performance when it occurs;
- A self-executing mechanism that does not leave the door open unreasonably to litigation and appeal;
- And reasonable assurances that the reported data is accurate.
- In addition to the FCC's well articulated criteria, the CLECs' compromise plan also reflects the following attributes of an effective remedy plan:
- Remedy payments increase on a per measure basis with the severity of the substandard performance and the duration of substandard performance.
- Remedies dynamically adjust to CLEC entry strategies and market size. Per measure additional remedies for chronic and severe failures, ensure that the remedies are right-sized to motivate the ILEC to fix rather than ignore the operational issues causing the disparity in performance.

II. Remedy Plan Structure

Remedies should be based on the expected financial gain to SBC/Ameritech-Illinois from impeding competition by providing sub-standard service to CLECs.

A. Remedy Cap

A review threshold for total remedies should be set no less than the FCC's recommendation of 36 percent of "Net Revenue," or $361 million for SBC/Ameritech-Illinois (see Table below for calculations). However, in light of the post-271 remedial actions of the FCC and New York Public Service Commission that raised the penalties for which Bell Atlantic New York was subject to 44 percent of net revenue, the CLECs recommend an initial review threshold of 44 percent or $441 million per year. If a remedy cap is established exceeding the review threshold, its value should be based on an economic and financial analysis of the expected financial gain to SBC/Ameritech-Illinois from deterring competition, adjusted for the probability of detection and punishment inherent in the performance plan. (See Hubert & Lehr). The CLEC plan does not propose an absolute remedy cap because such a cap reduces the effectiveness of the remedy plan with no offsetting benefits. It also allows SBC/Ameritech to calculate its total liability and limit it to a cost of doing business to maintain monopoly power.

Data for Illinois 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	Illinois Bell	1090	Total Operating Revenues	4,322,326	3,071,054	963,308
1999	Illinois Bell	1190	Total Operating Expenses	2,625,418	1,783,582	520,233
1999	Illinois Bell	1290	Other Operating Income/Losses	-1,560	-1,074	-339
1999	Illinois Bell	1390	Total Non-operating Items (Exp)	126,625	59,615	-60
1999	Illinois Bell	1490	Total Other Taxes	175,680	135,459	38,229
1999	Illinois Bell	1590	Federal Income Taxes (Exp)	493,559	359,726	132,130
1999	Illinois Bell	1915	Net Return	N/A	N/A	272,438

FCC's Net Return Calculation*

		Net Return	36% Net Return	44% Net Return
Illinois Bell	"Net Return"	1,004,036	361,453	441,776
Illinois Bell	75% Probability Adjustment		481,937	589,034

*Calculations are 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 [272438+3071054+-1074 - (1783582+59615+135459+359726)]= $1004036

B. Remedy Tiers

1. Tier I is paid to individual CLECs for poor performance received by each CLEC. Tier II is paid to the State of Illinois for poor performance delivered to the aggregate CLEC community. Tier I consequences help to ensure that harmed CLECs can remain viable in the market despite the inferior service; Tier II remedies redress systemic barriers to competition and ensure that remedies reach appropriate incentive levels.
2. While statistical tests are used to detect discrimination for parity measures (those where service levels provided to CLECs can be compared to the levels provided to retail customers or to SBC/Ameritech's affiliate, which ever is better), levels of remedies are based on actual differences in performance, as measured by collected data and sample size. Any miss of a benchmark measure (those where there is no comparable retail or affiliate analogue for comparison) would invoke a remedy that likewise would increase by a relative percentage range by which the benchmark is missed. Those measures that require parity comparisons and those that require benchmarks have been determined in the agreed measurements submitted to the Commission for approval on February 5, 2001 in Docket No. 01-0120.

   The 1996 Telecommunications Act ensures that ILEC treatment of CLECs is not only non-discriminatory, but also "just and reasonable." Service below the Commission's end user standards is not reasonable and the CLECs outline a plan to address this issue below:

C. Parity with a Floor

Proposal:

Periodically, SBC/Ameritech's own performance data for Illinois shows that they provide inferior service to both its wholesale and retail customers. Most states have employed

minimum standards of performance for retail customers, and when SBC/Ameritech fails to meet these minimum service levels, it causes the CLEC to be in violation of the state regulation as well. Although these service standards have been ordered by the states, they do not appear to have provided an adequate incentive for SBC/Ameritech to improve their performance in a consistent timely fashion. In addition to this, the states have a limited number of measures with standards as compared to the new proposed wholesale measures as being developed jointly by CLEC's and SBC/Ameritech throughout the SBC/Ameritech region.

This failure to meet a state's minimum required service level is of significant concern to CLECs because it causes harm in multiple ways -- (a) the CLEC customer's frustration, which rightfully should be directed at SBC/Ameritech, is aimed at the CLEC, leading many times to loss of that customer; (b) the wrongfully placed ill-will against any particular CLEC often balloons into mistrust of all new competitors by the harmed customers and the many others with which he/she shares the poor service story; (c) CLECs, as telecommunications providers in Illinois may be held responsible for the violation of regulations through fines or credits and waivers to customers; and (d) the public interest calls for regulators to promote choice between good quality, not equally poor quality service providers. Even beyond the limited number of services for which retail end user standards exist, some performance areas are so critical, such as prompt restoral of high capacity loops for the business customers whose livelihoods depend on them, that minimum acceptable performance intervals are also required.

Additionally, on occasion, some CLECs have tried to validate SBC/Ameritech provided data against their own internal reporting and found the gaps to be even greater than what is indicated.

Due to these concerns, the CLECs propose the "Parity with a Floor" concept to be put in place as a backstop for key measures where parity is used as the performance standard. CLECs view this proposal as a means to obligate SBC/Ameritech to provide a minimum level of service to all customers and to motivate SBC/Ameritech to improve upon that base

level wherever possible. For these key measures, parity will be the primary performance standard, however, for the sake of both retail and wholesale customers; parity must be at a minimum level to be considered as reasonably adequate service. Simply stated, parity of poor performance is still poor performance.

Key Indicators:

Out of several parity measures, only 17 measures, along with their corresponding sub-measures will be held to the "Parity with a Floor" concept. These 17 represent high customer impact, along with being business critical. The 17 measures are as follows:

PM #27 - Mean Installation Interval
PM #28 - Percent Installations Completed within "X" days
PM #29 – Percent Ameritech Caused Missed Due Dates
PM #35 – Percent of Trouble Reports within 30 days of Installation.
PM #38 – Percent Missed Repair Commitments
PM #39 – Receipt to Clear Duration
PM #40 - Percent of Out of Service Intervals < 24 hours.
PM #41 – Percent Repeat Trouble Reports – POTS
PM #55 - Average Installation Interval
PM #55.1 - Average Installation Interval – DSL
PM #56 - Percent Installations Completed within "X" days.
PM #58 – Percent Ameritech Caused Missed Due Dates
PM #59 – Percent of Trouble Reports within 30 days of Installation.
PM #67 – Mean Time to Restore
PM #68 – Percent of Out of Service (OOS) < 24 hours.
PM #69 – Percent Repeat Reports
PM #117 – Percent NXXs Loaded and Tested Prior to Effective Date

- **Floors:**

The following table represents the proposed "floor" for each respective measure:

Measure #:	**Measure:**	**Floor:**	**Source:**
PM #27	Mean Installation Interval	≤ 2.42 Business days	PSCW Order, 05-TI-248, 2/21/00 Ameritech Price Regulation Standards
PM #28(a)	Percent Installations Completed within 3 Days – No Field Work	Suggest 90% within 3 business days.	A review of SBC's historical data across the various states indicates best performance in IN & OH. WI, MI, & IL are very bad with ranges of 34% to 100%. That's way too big a spread!
PM #28(b)	Percent Installations Completed within 5 Days – Field Work	≥ 90% within 5 Business Days.	Ohio MTSS Standards @ http://www.puc.state.oh.us/ohioutil/Telecommunications/MTSStandards.pdf
PM #29	Ameritech Caused Missed Due Dates	≤ 10%	ORR Admincode @ http://www.state.mi.us/webapp/orr/admincode.asp?AdminCode=Single&Admin_Num=48400001&Dpt=CI&RngHigh=
PM #35	Percent of Trouble Reports within 10 Days of Installation	≤ 5%	Internal Resources
PM #38	Percent Missed Repair Commitments	< 1%	LCUG Service Quality Measurements v7.0
PM #39(a)	Receipt to Clear – Out of Service Troubles	≤ 14.56 hours	PSCW Order, 05-TI-248, 02/21/00 Ameritech Price Regulation Standards
PM #39(b)	Receipt to Clear – Non - Out of Service Troubles	≤ 36 hours	ORR Admincode @ http://www.state.mi.us/webapp/orr/admincode.asp?AdminCode=Single&Admin_Num=48400001&Dpt=CI&RngHigh=
PM #40	Percent Out of Service Intervals < 24 Hours	>=95%	Common Industry Standard
PM #41	Percent Repeat Trouble Reports	<= 1%	LCUG Service Quality Measurements v7.0
PM #55	Average Installation Interval	<= 4 Business Days	CLEC Internal Resources
PM #55.1	Average Installation Interval - DSL	<= 4 Business Days	CLEC Internal Resources
PM #56	Percent Installations Completed within "X"	<Open for discussions>	<Open for discussions>

	Days		
PM #58	Percent Ameritech Caused Missed Due Dates	<=10%	CLEC Internal Resources
PM #59	Percent of Trouble Reports within 30 days of Installation	<=5%	Mirror of POTS
PM #67	Mean Time to Restore	<=8 hours	CLEC Internal Resources
PM #68	Percent of Out of Service (OOS) < 24 Hours	>=95%	Mirror of POTS
PM #69	Percent Repeat Reports	<=1%	Mirror of POTS
PM #117	Percent NXX's loaded and Tested Prior to Effective Date.	100% by LERG effective date.	LERG is an established industry process that all carriers are to be following.

- **Example:**

  Measure #39 Receipt to Clear Duration – Out of Service Troubles.
  If SBC/Ameritech, on average, cleared Out of Service Troubles in 14 hours for their retail customers, and cleared them in 13 hours for the CLEC's customers, SBC/Ameritech not only provide parity, but also within the "floor". SBC/Ameritech met its obligation.

  If SBC/Ameritech, on average, cleared Out of Service Troubles in 37 hours for their retail customers, and cleared them in 36 hours for the CLEC's customers, SBC/Ameritech indeed provided parity, but parity in itself represented unacceptable service. SBC/Ameritech should be subject to appropriate action.

- **Implementation:**

  CLEC's acknowledge that in the areas where SBC/Ameritech is providing inferior service to its customers, that dramatic improvement can not happen over night. With that, CLEC's propose allowing Ameritech/SBC a 90 day grace period to identify, address and correct the root cause of their poor performance before being subject to any remedy implications.

- **Remedies:**

SBC/Ameritech will be subject to per measure remedies outlined in the table below:

Performance	**Remedy amount per measure per CLEC**
Floor or better	$0
Up to 10% worse than Floor	0.00025% of "Net Revenue" for SBC/Ameritech for the applicable state
10.01% - 20% worse than Floor	0.00050% of "Net Revenue" for SBC/Ameritech for the applicable state
20.01% - 30% worse than Floor	0.00075% of "Net Revenue" for SBC/Ameritech for the applicable state
30.01% - 40% worse than Floor	0.001% of "Net Revenue" for SBC/Ameritech for the applicable state
40.01% - 50% worse than Floor	0.0015% of "Net Revenue" for SBC/Ameritech for the applicable state
50.01% - 60% worse than Floor	0.002% of "Net Revenue" for SBC/Ameritech for the applicable state
60.01% - 70% worse than Floor	0.0025% of "Net Revenue" for SBC/Ameritech for the applicable state
70.01% - 80% worse than Floor	0.003% of "Net Revenue" for SBC/Ameritech for the applicable state
80.01% - 90% worse than Floor	0.0035% of "Net Revenue" for SBC/Ameritech for the applicable state
90.01% - 100% worse than Floor	0.004% of "Net Revenue" for SBC/Ameritech for the applicable state
Greater than 100% worse than Floor	0.005% of "Net Revenue" for SBC/Ameritech for the applicable state

- **Remedy examples/calculations:**

Examples listed below are using Data for Illinois from ARMIS 43-01 (1999) - (Downloaded from FCC Website: http://www/fcc/gov/ccb/armis/) 1999 Net Return=$1,004,036,000

Ex #1: SBC/Ameritech-Illinois, on average clears Retail customers Out of Service troubles in 18 hours, and clears CLEC "X" Out of Service troubles in an average of 17 hours. Ameritech provided parity to both retail and wholesale customers; however, parity did not meet the floor.

Using the calculation, and rules mentioned above, SBC/Ameritech would be required to pay the State of Illinois $5,020. (Using 17 hours in this example, you take 2.44 (17 hours minus the floor of 14.56 = 2.44) divided by the floor of 14.56 hours and get 16.8%. [(17-14.56)/14.56]=16.8%. 16.8% falls in the category of 10.01% - 20% worse than floor, so the remedy amount is the corresponding $5,020.

Ex #2: SBC/Ameritech-Illinois misses the floor by 15% for 10 sub-measures for 10 CLECs. SBC/Ameritech-Illinois would pay the state $502,000. (10 sub-measures multiplied by 10 CLECs multiplied by $5,020) or (10x10x$5,020=$502,000).

Ex #3: SBC/Ameritech-Illinois misses the floor by 25% for 10 sub-measures for 15 CLECs. SBC/Ameritech-Illinois would pay the state $1,129,500. (10 sub-measures multiplied by 15 CLECs multiplied by $7,530) or (10x15x$7,530=$1,129,500).

- **Payments:**

  Due to both the wholesale and retail customers are affected by Ameritech/SBC's poor performance, 100% of the remedy monies shall be paid to the respective State suffering the poor performance. No monies derived from this "Parity with a floor" shall be paid to the CLEC's. The remedies shall be made payable via a check. The CLECs propose that the proceeds from these remedies be used for enforcement and customer education of interconnection and wholesale and retail performance.

- **Gap Closure:**

  In the event that SBC/Ameritech is performing greater than 10% worse than any given Floor, SBC/Ameritech must provide a Gap Closure plan.
  A "Gap Closure Plan" will involve a detailed plan of action that SBC/Ameritech has in place to correct the performance.

The Gap Closure Plan must be presented by the CEO of SBC/Ameritech to the CEO of the affected CLEC's, in addition to a designated representative of the Illinois Commerce Commission staff.

The purpose of this requirement is purely to gain exposure by SBC/Ameritech Executive management as opposed to checks simply being cut.

7. Application to Remedy Tiers

a. **Parity Measure Remedies For Tier I-** Remedies for parity measurements are based upon statistical comparison of service performance levels provided to each CLEC, compared to service levels provided by SBC/Ameritech to retail customers and to SBC/Ameritech's affiliate. The CLECs believe that the intent of the Telecommunications Act of 1996 is clear – SBC/Ameritech must provide parity service to CLECs as compared to its treatment of affiliates as well as its retail customers. Therefore, the CLECs propose that remedies would be due for parity measures that show either superior retail or affiliate treatment compared to wholesale performance. Performance levels are based upon evaluation of the modified z-score statistic (z) as defined in the Local Competition Users Service Group document "Statistical Tests for Local Service Parity." (See attached). The modified z-score is a statistic that is calculated from retail and wholesale performance data that can be used as an index to test whether retail and wholesale performance are substantially the same. If the modified z score is less than a critical value, as determined below, then the statistical test signals that a disparity of service exists between wholesale and retail performance. The CLECs propose that for all sufficiently disaggregated submeasures that the critical value be determined in a manner that balances the probability of Type I (ILEC found guilty when innocent) and Type II (ILEC found innocent when guilty) error probabilities. Since a fixed critical value will not accomplish this, the CLECs have agreed to use the balancing methodology proposed in Appendix C of the Statistician's joint filing for Louisiana Public Service Commission (LPSC) Docket U-22252 Subdocket C[2], hereto attached as Attachment 1, to detect discrimination in all

[2] Statistical Techniques For The Analysis And Comparison Of Performance Measurement Data. Submitted to Louisiana Public Service Commission (LPSC) Docket U-22252 Subdocket C.

submeasures. Since the appendix performs the calculation for the more general case of a truncated z score and deeply disaggregated submeasures, we have also attached a specific calculation for use with the modified z score as defined in this plan for use in the State of Illinois with its set of performance measures (See Attachment 2.) The CLECs propose the use of this methodology with a delta value of 0.25.[3]Incorporating this delta along with the number of data points collected by submeasure, a balancing critical value, z*, is easily calculated for each remediable submeasure. When the modified z-score statistic is compared to the balancing critical value, a sample size independent test occurs which automatically balances the Type I and Type II error probabilities. Furthermore, the ratio of the modified z-score to the balancing critical value is an explicitly sample size independent measure of the severity of the miss, which is used to escalate remedy dollar amounts in this proposal.

Furthermore, in order to increase computational stability and avoid potential gaming, the CLECs propose that remedy amounts should be a continuous function of severity, once disparity is declared by the test. In the CLEC proposal a simple quadratic function is used to easily compute these dollar amounts.

MAGNITUDE PAYMENTS FOR PARITY MEASURE MISSES

Range of modified z-statistic value (z)	**Performance Designation**	**Applicable Consequence ($)**
greater than or equal z*	Compliant	0
less than z* to 5z*/3	Basic Failure	

[3] Delta is a standardized measure of material difference between ILEC performance for its retail or affiliate compared to the ILECs whole performance for the CLECs. . The 0.25 delta chosen is a compromise position. Some CLECs were concerned that 0.25 was too generous and that CLECs could still be harmed competitively without remedy using this delta. The CLECs agreed to the joint proposal as an opportunity to study the impact of the 0.25 delta pending the six month review of the plan.

less than 5z*/3 to 3z*	Intermediate Failure	$a(z/z^*)^2 + b(z/z^*) + c$
less than 3z*	Severe Failure	25,000[4]

a = 5625

b = -11250

c = 8125.

In this table it is assumed that a submeasure is worse as its value gets larger and that the definition of modified z score (z) is the same as in the Texas business rules.

b. Benchmark Measure Remedy for Tier I - Remedies for benchmark measures are based upon a comparison of achieved service performance levels for CLECs to the established benchmarks. The benchmark levels were established at the lower end of acceptable performance in order to provide the minimum acceptable level of service that would allow the CLECs to compete. These levels should therefore be met 100% of the time. However, to account for random variation, engineering compromises, etc., the benchmark proportions (B) are set at less than 100% depending on the submeasure. Therefore, the resulting benchmark proportions should be considered a "bright line" limit that SBC/Ameritech must meet, and no further statistical considerations are needed. Although further statistical considerations would lead to multiple mitigation in a remedy plan, it would be unfair to order the ILEC to satisfy the benchmarks when sample sizes are small. In such cases a small sample size table is included for benchmarks in this proposal.

Service performance levels that do not achieve the benchmarks are subject to remedy payments. The CLECs have compromised on the values in the charts below. The dollar amounts take into account that the remedies associated with missing a strict benchmark proportion (e.g., 99%) should escalate faster than remedies associated with a less strict benchmark proportion (e.g., 90%).

[4] The levels in the plan will need to be revisited as market entry increases, particularly with the availability of UNE-P and EELs products. At some point, these per measure remedy levels will become an inadequate deterrent to discrimination when CLEC ordering volumes are high.

MAGNITUDE PAYMENTS FOR BENCHMARK MEASURE MISSES

CLEC Data Set Size	Benchmark Percentage Adjustments for Small Data Sets (Applicable to Data Sets < 30)		
	85.0%	**90.0%**	**95.0%**
5	80.0%	80.0%	80.0%
6	83.3%	83.3%	83.3%
7	85.0%	85.7%	85.7%
8	75.0%	87.5%	87.5%
9	77.8%	88.9%	88.9%
10	80.0%	90.0%	90.0%
20	85.0%	90.0%	95.0%
30	83.3%	90.0%	93.3%

Range of Benchmark Result (x)	Performance Designation	Applicable Consequence ($)
Meets or exceeds B%	Compliant	0
Meets or exceeds (1.5B-50)% but worse than B%	Basic Failure	$d[x/(100-B)]^2 + eB[x/(100-B)^2] + f[B/(100-B)]^2 + g$
Meets or exceeds (2B-100)% but worse than (1.5B-50)%	Intermediate Failure	
Worse than (2B-100)%	Severe Failure	25,000

Where,

d = 22500

e = -45000

f = 22500

g = 2500

c. **Parity Measure Remedies for Tier II -** The same rules apply under Tier II to the aggregate (or pooled) data of the individual CLECs as are employed for the individual CLEC data under Tier I, except that a more lenient 5z*/3 critical value is used.

Range of modified z-statistic value (z)	Performance Designation	Applicable Consequence ($)
greater than or equal 5z*/3	Indeterminate	0
less than 5z*/3 to 3z*	Market Impacting	n [a(z/z*)^2 + b(z/z*) + c]
less than 3z*	Market Constraining	n25,000

The value for "n" should be determined based upon the most recent data for the state and relating to resold lines and UNE loops as reported in the Report of Local Competition published by the FCC. The calculation would be based on the most current data reported to the FCC and be as follows: (resold lines + UNE loops)/(total switched lines). This will give the percentage of SBC/Ameritech Illinois switched lines purchased by CLECs. The result represents the level of competition in the state of Illinois

Lines provided to CLECs/Total SBC/Ameritech and CLEC Lines	Value of "n"
more than 50%	0
more than 40% less than or equal 50%	1
more than 30% less than or equal 40%	2
more than 20% less than or equal 30%	4
more than 10% less than or equal 20%	6
more than 5% less than or equal 10%	8
0% to less than or equal 5%	10

Thus, as competition becomes established, the size of the applicable Tier II consequence is reduced to zero if SBC/Ameritech no longer provides a majority of the local lines to the CLECs in its serving area. Based upon current data, the current value of "n" for SBC/Ameritech Illinois is 10.

d. **Benchmark Measure Remedies for Tier II -** The same rules apply under Tier II to the aggregate (or pooled) data of the individual CLECs as are employed for the individual

CLEC data under Tier I, except that consequences do not apply until the pooled CLEC performance results degrades to a point that is equivalent to an intermediate failure designation.

TIER II REMEDY PAYMENTS - BENCHMARK MEASURES

Range of Benchmark Result (x)	Failure Designation	Applicable Consequence ($)
Meets or exceeds (1.5B-50)%	Indeterminate	0
Meets or exceeds (2B-100)% but worse than (1.5B-50)%	Market Impacting	n $\{d[x/(100-B)]^2 + eB[x/(100-B)^2] + f[B/(100-B)]^2 + g\}$
Worse than (2B-100)%	Market Constraining	n25,000

e. **Chronic Remedy Payments -** Regardless of the type of measurement (parity or benchmark), if performance fails to achieve the Compliant level in consecutive reporting periods, then additional consequences should apply. The recommended treatment for chronic failures is to assess a chronic failure over-ride in the third consecutive month of non-compliant performance. When the chronic failure override applies, a consequence equal to a "Severe Failure" ($25,000 per chronic failure per month) for Tier I and "Market Constraining" (n$25,000 per chronic failure per month) for Tier II should apply until such time as performance for the specific measurement result is again classified as Compliant.

f. **Review Threshold** – In addition to establishing an overall review threshold at 36% net local return, regulatory review also would be triggered without withholding remedies in escrow for any month where SBC/Ameritech's remedy payments exceed 1/6 of $125M,

or $ 20.8M. The review would focus on discovering the source of SBC/Ameritech's poor performance, and on how the Commission could incent compliant performance promptly, which may include additional remedies or other consequences such as a recommendation that the FCC suspend or not grant 271 relief and/or marketing.

g. **Reporting** -- Remedies are applicable to non-regulatory approved late reports, incomplete reports (missing sub-metrics) and late corrective action reports where they are applicable. These payments will be made to the State of Illinois. These remedies are outlined below.

h. **<u>Late Reports</u>**

Late Reports Per Day	$5,000
Incomplete Reports Per Submetric Per Day	$1,000
Late Corrective Action Reports	$5,000
Late Or Missing Change Management Notices for Metrics and/or Unauthorized* Noticed Changes	$5,000

*Unauthorized means change made unilaterally by SBC/Ameritech without agreement from CLEC collaborative participants.

i. **Reporting Structure:**

SBC/Ameritech Illinois retail data shall be compared to individual CLEC data and, separately, to aggregate CLEC data that excludes the affiliate data. Additionally, SBC/Ameritech's affiliate data shall be compared to individual CLEC data and, separately, to aggregate CLEC data.

CLECs shall have the right to review SBC/Ameritech data, and SBC/Ameritech affiliate raw data, subject to an appropriate protective agreement.

III. Application and Payment of Performance Remedies

A. The remedy plan supplements remedies already included in CLEC interconnection agreements. CLECs also may voluntarily negotiate additions, deletions or changes to the metrics adopted in this collaborative for inclusion in interconnection agreements. Upon issuance of an order by the Commission approving this remedy plan, the metrics developed and remedies would be in force for all CLECs buying service through tariff or interconnection agreement from SBC/Ameritech. A CLEC wishing to be subject to the remedy plan would be required to notify SBC/Ameritech and the Commission in writing and the CLEC's "opt-in" would become effective 20 days from the date of said written notice. Voluntarily negotiated amendments to the remedy plan must also be filed with the Commission and would be automatically approved unless rejected by the Commission within 30 days of filing.

B. Performance remedy payments will be determined on a monthly basis and will be applied at a submeasure level for each CLEC for each failed submeasure.

C. Performance measures and remedies apply to all types of CLEC services, regardless of mode of entry, including but not limited to special access and high capacity services.

D. Payments to the CLECs will be made by check by the end of the month following the data report (e.g. June data, reported in July, remedies paid by August 31). An invoice will accompany the payment explaining the calculation of each submetric missed (base and any magnitude or duration remedies should be specified). Payment by check is necessary in order to ensure certain payment and is easier for the CLECs to administer and track. Bill credits are inappropriate as they are not easily traceable to a specific CLEC account for credit, are less visible to SBC/Ameritech executives and hence less likely to incent improvement and are hard to track when SBC/Ameritech billing is erratic or subject to numerous billing disputes. Remedies for prior periods also can potentially be greater than the bill for a given month. It is counterintuitive to require CLECs to buy

additional services from a vendor to receive full compensation for past inferior performance.

E. Participation in this remedy plan does not affect a CLEC's right to bring a separate action before a state commission, the Federal Communications Commission, or the courts for a violation by SBC-Ameritech of the Telecommunications Act of 1996. The existence of this plan similarly does not affect a state commission's authority under either federal or state law to hear such an action or commence such an action on its own initiative, and to redress such a violation in the form of damages or official findings.

F. To the extent the same performance measures are reported on a regional basis by SBC/Ameritech and any of the State PUCs or FCC makes a finding that SBC/Ameritech misreports wholesale data, the Commission may fine SBC/Ameritech up to $10,000 per misreported performance measure.

IV. Mitigation Measures and Dispute Resolution

The use of statistical testing employing the balancing methodology provides a reasonable level of deviation from a strict parity requirement and helps equalize the effects of random variation among all parties. For parity measures that represent worse performance when they have larger values, a Tier 1 modified z score less than 0 indicates that the CLEC received poorer average performance than SBC/Ameritech provided for itself within the monthly sampled data. Therefore, if we declare disparity when the value of the modified z score, as calculated from the data, is below the (negative) balancing value (z*) we provide the only mitigation required**.** For Tier 2 performance measures, which have still more negative critical value (5z*/3) of the modified z test for the aggregated CLEC data, mitigation is even greater. However, remedies are potentially greater on declaration of disparity. No additional mitigation (such as a k-table) is required, which greatly simplifies the operation, directness, and understandability of the plan.

SBC/Ameritech will perform a limited root-cause analysis process at a CLEC’s request for chronic performance failures.

Either SBC/Ameritech or the CLEC may initiate a request for an expedited hearing process to resolve differences associated with performance parity and remedy payment issues; however, payments must continue to the CLECs pending the outcome of such proceeding.

V. Audits

A. Annual Audit

SBC/Ameritech will support (i.e., pay for) an annual comprehensive audit of its reporting procedures and reportable data. SBC/Ameritech will include all systems, processes and procedures associated with the production and reporting of performance measurement results. A third party auditor will perform this audit. SBC/Ameritech and the CLECs will jointly select the third party auditor. If the parties cannot agree on the auditor, the auditors selected by each party will jointly determine the auditor. Costs for these annual audits will be borne by SBC/Ameritech.

The comprehensive Annual Audits will be conducted every twelve (12) months, with the first such audit commencing twelve (12) months after the conclusion of the KPMG OSS Test's metric replication. (At its completion, SBC/Ameritech shall submit its annual comprehensive audit to the Commission and distribute copies to CLECs.

B. Mini – Audits:

In addition to an annual audit, the CLECs would have the right to mini-audits of individual performance measures/submeasures during the year. When a CLEC has reason to believe the data collected for a measure is flawed or the reporting criteria for the measure is not being adhered to, it has the right to have a mini-audit performed on the specific measure/sub-measure upon written request (including e-mail), which will include the designation of a CLEC

representative to engage in discussions with SBC/Ameritech about the requested mini-audit. If, 30 days after the CLEC's written request, the CLEC believes that the issue has not been resolved to its satisfaction, the CLEC will commence the mini-audit upon providing SBC/Ameritech with 5 business days advance written notice. Each CLEC would be limited to auditing three single measures/sub-measures or one domain area (preorder, ordering, provisioning, maintenance or billing) during the audit year. The audit year shall commence with the start of the KPMG OSS test (or an Annual Audit). Mini-Audits may be requested for months including and subsequent to the month in which the KPMG OSS or an Annual Audit was initiated. Mini-audits cannot be requested by a CLEC while the OSS third party test or an Annual Audit is being conducted (i.e. before completion).

Mini-Audits will include all systems, processes and procedures associated with the production and reporting of performance measurement results for the audited measure/sub-measure. Mini-Audits will include two (2) months of data, and all parties agree that raw data supporting the performance measurement results will be available monthly to CLECs.

No more than three (3) Mini-Audits will be conducted simultaneously unless more than one CLEC wants the same measure/sub-measure audited at the same time, in which case, Mini-Audits of the same measure/sub-measure shall count as one Mini-Audit for the purposes of this paragraph only.

A third party auditor, selected by the same method as described above, will conduct mini-Audits. SBC/Ameritech will pay for fifty percent (50%) of the costs of the mini-audits. The other fifty percent (50%) of the costs will be divided among the CLEC(s) requesting the mini-audit unless SBC/Ameritech is found to be "materially" misreporting or misrepresenting data or to have non-compliant procedures, in which case, SBC/Ameritech would pay for the entire cost of the third party auditor. SBC/Ameritech will be deemed "materially" at fault when a reported successful measure changes as a consequence of the audit to a missed measure, or there is a change from an ordinary missed measure to intermediate or severe. Each party to the Mini-Audit shall bear its own internal costs, regardless of which party ultimately bears the costs of the third party auditor.

If, during a Mini-Audit, it is found that for more than 30% of the measures in a major service category SBC/Ameritech is "materially" at fault (i.e., a reported successful measure changes as a consequence of the audit to a missed measure, or there is a change from an ordinary missed measure to intermediate or severe), the entire service category will be re-audited at the expense of SBC/Ameritech. The major service categories for this purpose are:

- Pre-Ordering/Ordering
- Billing
- Provisioning - POTS and UNE Loop and Port Combinations
- Provisioning - Resale Specials and UNE Loop and Port Combinations
- Provisioning - Unbundled Network Elements
- Maintenance - POTS and UNE Loop and Port Combinations
- Maintenance - Resale Specials and UNE Loop and Port Combinations
- Maintenance - Unbundled Network Elements
- Interconnection Trunks
- Local Number Portability
- Database - 911
- Database - Directory Assistance
- Database - NXX
- Collocation
- Coordinated Conversions

Each Mini-Audit shall be submitted to the CLEC involved and to the Commission as a proprietary document. SBC/Ameritech will provide notification to all CLECs of any Mini-Audit requested when the request for the audit is made.

Attachment 1

Appendix C
Balancing the Type I and Type II Error Probabilities of the Truncated Z Test Statistic

This appendix describes the methodology for balancing the error probabilities when the Truncated Z statistic, described in Appendix A, is used for performance measure parity testing. There are four key elements of the statistical testing process:

1. the null hypothesis, H_0, that parity exists between ILEC and CLEC services
2. the alternative hypothesis, H_a, that the ILEC is giving better service to its own customers
3. the Truncated Z test statistic, Z^T, and
4. a critical value, c

The decision rule[5] is

- If $Z^T < c$ then accept H_a.
- If $Z^T \geq c$ then accept H_0.

There are two types of error possible when using such a decision rule:

Type I Error: Deciding favoritism exists when there is, in fact, no favoritism.
Type II Error: Deciding parity exists when there is, in fact, favoritism.

The probabilities of each type of each are:

Type I Error: $\alpha = P(Z^T < c \mid H_0)$.

Type II Error: $\beta = P(Z^T \geq c \mid H_a)$.

In what follows, we show how to find a balancing critical value, c_B, so that $\alpha = \beta$.

General Methodology

The general form of the test statistic that is being used is

$$z_0 = \frac{\hat{T} - E(\hat{T}|H_0)}{SE(\hat{T}|H_0)}, \qquad \text{(C.1)}$$

where

$\hat{T}$ is an estimator that is (approximately) normally distributed,

$E(\hat{T} \mid H_0)$ is the expected value (mean) of $\hat{T}$ under the null hypothesis, and

[5] This decision rule assumes that the smaller a performance measure is, the better the service. If the opposite is true, then reverse the decision rule.

$SE(\hat{T} \mid H_0)$ is the standard error of $\hat{T}$ under the null hypothesis.

Thus, under the null hypothesis, z_0 follows a standard normal distribution. However, this is not true under the alternative hypothesis. In this case,

$$z_a = \frac{\hat{T} - E(\hat{T}|H_a)}{SE(\hat{T}|H_a)}$$

has a standard normal distribution. Here

$E(\hat{T} \mid H_a)$ is the expected value (mean) of $\hat{T}$ under the alternative hypothesis, and

$SE(\hat{T} \mid H_a)$ is the standard error of $\hat{T}$ under the alternative hypothesis.

Notice that

$$\begin{aligned} \beta &= P(z_0 > c \mid H_a) \\ &= P\left(z_a > \frac{c\,SE(\hat{T} \mid H_0) + E(\hat{T} \mid H_0) - E(\hat{T} \mid H_a)}{SE(\hat{T} \mid H_a)} \right) \end{aligned} \tag{C.2}$$

and recall that for a standard normal random variable z and a constant *b*, P(z < *b*) = P(z > -*b*). Thus,

$$\alpha = P(z_0 < c) = P(z_0 > -c) \tag{C.3}$$

Since we want $\alpha = \beta$, the right hand sides of (C.2) and (C.3) represent the same area under the standard normal density. Therefore, it must be the case that

$$-c = \frac{c\,SE(\hat{T} \mid H_0) + E(\hat{T} \mid H_0) - E(\hat{T} \mid H_a)}{SE(\hat{T} \mid H_a)}.$$

Solving this for *c* give the general formula for a balancing critical value:

$$c_B = \frac{E(\hat{T} \mid H_a) - E(\hat{T} \mid H_0)}{SE(\hat{T} \mid H_a) + SE(\hat{T} \mid H_0)} \tag{C.4}$$

The Balancing Critical Value of the Truncated Z

In Appendix A, the Truncated Z statistic is defined as

$$Z^T = \frac{\sum_j W_j Z_j^* - \sum_j W_j E(Z_j^* | H_0)}{\sqrt{\sum_j W_j^2 \mathrm{Var}(Z_j^* | H_0)}}$$

In terms of equation (C.1) we have

$$\hat{T} = \sum_j W_j Z_j^*$$

$$E(\hat{T} \mid H_0) = \sum_j W_j E(Z_j^* \mid H_0)$$

$$SE(\hat{T} \mid H_0) = \sqrt{\sum_j W_j^2 Var(Z_j^* \mid H_0)}$$

To compute the balancing critical value(C.4), we also need $E(\hat{T}|H_a)$ and $SE(\hat{T}|H_a)$. These values are determined by

$$E(\hat{T}|H_a) = \sum_j W_j E(Z_j^* \mid H_a), \text{ and}$$

$$SE(\hat{T}|H_a) = \sqrt{\sum_j W_j^2 \, var(Z_j^* \mid H_a)} \, .$$

In which case equation (C.4) gives

$$c_B = \frac{\sum_j W_j E(Z_j^* \mid H_a) - \sum_j W_j E(Z_j^* \mid H_0)}{\sqrt{\sum_j W_j^2 \, var(Z_j^* \mid H_a)} + \sqrt{\sum_j W_j^2 \, var(Z_j^* \mid H_0)}} \, . \qquad \text{(C.5)}$$

Thus, we need to determine how to calculate $E(Z_j^* \mid H_0)$, $Var(Z_j^* \mid H_0)$, $E(Z_j^* \mid H_a)$, and $Var(Z_j^* \mid H_a)$. These values depend on the distribution of Z_j (see Appendix A) under the null and alternative hypotheses.

One possible set of hypotheses, that take into account the assumption that transaction are identically distributed within cells, is:

H_0: $\mu_{1j} = \mu_{2j}$, $\sigma_{1j}^2 = \sigma_{2j}^2$

H_a: $\mu_{2j} = \mu_{1j} + \delta_j \cdot \sigma_{1j}$, $\sigma_{2j}^2 = \lambda_j \cdot \sigma_{1j}^2$ $\qquad$ $\delta_j > 0$, $\lambda_j \geq 1$ and $j = 1,\ldots,L$.

Under this null hypothesis, Z_j has a standard normal distribution within each cell j. In which case,

$$E(Z_j^* \mid H_0) = -\frac{1}{\sqrt{2\pi}}, \text{ and}$$

$$var(Z_j^* \mid H_0) = \frac{1}{2} - \frac{1}{2\pi} \, .$$

Under the alternative hypothesis, Z_j has a normal distribution with

$$E(Z_j \mid H_a) = m_j = \frac{-\delta_j}{\sqrt{\frac{1}{n_{1j}} + \frac{1}{n_{2j}}}}, \text{ and}$$

$$SE(Z_j \mid H_a) = se_j = \sqrt{\frac{\lambda_j n_{1j} + n_{2j}}{n_{1j} + n_{2j}}}$$

In general, the mean of a normal distribution truncated at 0 is

$$M(\mu,\sigma) = \int_{-\infty}^{0} \frac{x}{\sqrt{2\pi}\sigma} \exp(-\tfrac{1}{2}\left(\tfrac{x-\mu}{\sigma}\right)^2)dx \ ,$$

and the variance is

$$V(\mu,\sigma) = \int_{-\infty}^{0} \frac{x^2}{\sqrt{2\pi}\sigma} \exp(-\tfrac{1}{2}\left(\tfrac{x-\mu}{\sigma}\right)^2)dx - M(\mu,\sigma)^2$$

It can be shown that

$$M(\mu,\sigma) = \mu\,\Phi(\tfrac{-\mu}{\sigma}) - \sigma\,\phi(\tfrac{-\mu}{\sigma})$$

and

$$V(\mu,\sigma) = (\mu^2 + \sigma^2)\Phi(\tfrac{-\mu}{\sigma}) - \mu\sigma\,\phi(\tfrac{-\mu}{\sigma}) - M(\mu,\sigma)^2$$

where $\Phi(\cdot)$ is the cumulative standard normal distribution function, and $\phi(\cdot)$ is the standard normal density function.

Using the above notation, and equation (C.5), we get the formula for the balancing critical of Z^T for the alternative hypothesis defined above.

$$c_B = \frac{\sum_j W_j M(m_j, se_j) - \sum_j W_j \frac{-1}{\sqrt{2\pi}}}{\sqrt{\sum_j W_j^2 V(m_j, se_j)} + \sqrt{\sum_j W_j^2 \left(\frac{1}{2} - \frac{1}{2\pi}\right)}} \ . \qquad \text{(C.6)}$$

This formula assumes that Z_j, is approximately normally distributed within cell j. When the cell sample sizes, n_{1j} and n_{2j}, are small this may not be true. It is possible to determine the cell mean and variance under the null hypothesis when the cell sample sizes are small. It is much more difficult to determine these values under the alternative hypothesis. Since the cell weight, W_j will also be small (see Appendix A) for a cell with small volume, the cell mean and variance will not contribute much to the weighted sum. Therefore, formula (C.6) should provide a reasonable approximation to the balancing critical value.

Determining the Parameters of the Alternative Hypothesis

In this appendix we have indexed the alternative hypothesis by two sets of parameters, λ_j and δ_j. While statistical science can be used to evaluate the impact of different choices of these parameters, there is not much that an appeal to statistical principles can offer in directing specific choices. Specific choices are best left to telephony experts. Still, it is possible to comment on some aspects of these choices:

- <u>Parameter Choices for λ_j</u>. The set of parameters λ_j index alternatives to the null hypothesis that arise because there might be greater unpredictability or variability in the delivery of service to a CLEC customer over that which would be achieved for an otherwise comparable ILEC customer. While

concerns about differences in the variability of service are important, it turns out that the truncated Z testing which is being recommended here is relatively insensitive to all but very large values of the λ_j. Put another way, reasonable differences in the values chosen here could make very little difference in the balancing points chosen.

- Parameter Choices for δ_j. The set of parameters δ_j are much more important in the choice of the balancing point than was true for the λ_j. The reason for this is that they directly index differences in average service. The truncated Z test is very sensitive to any such differences; hence, even small disagreements among experts in the choice of the δ_j could be very important. Sample size matters here too. For example, setting all the δ_j to a single value — $\delta_j = \delta$ — might be fine for tests across individual CLECs where currently in Louisiana the CLEC customer bases are not too different. Using the same value of δ for the overall state testing does not seem sensible, however, since the state sample would be so much larger.

The bottom line here is that beyond a few general considerations, like those given above, a principled approach to the choice of the alternative hypotheses to guard against must come from elsewhere.

Attachment 2

Balancing the Type I and Type II Error Probabilities of the Modified Z Test Statistic

This paper describes the methodology for balancing the error probabilities when the Modified Z statistic is used for performance measure parity testing. There are four key elements of the statistical testing process:

1. the null hypothesis, H_0, that parity exists between ILEC and CLEC services,
2. the alternative hypothesis, H_a, that the ILEC is giving better service to its own customers,
3. the Modified Z test statistic, Z, and
4. a critical value, c.

The decision rule[6] is

- If $Z < c$, then accept H_a.
- If $Z \geq c$, then accept H_0.

There are two types of error possible when using such a decision rule:

Type I Error: Deciding favoritism exists (accept H_a) when there is, in fact, no favoritism (H_0 is true).
Type II Error: Deciding parity exists (accept H_0) when there is, in fact, favoritism (H_a is true).

The probabilities of the two types of error are:

Type I Error: $\alpha = P(Z < c \mid H_0)$.
Type II Error: $\beta = P(Z \geq c \mid H_a)$.

In what follows, we show how to find a balancing critical value, c_B, so that $\alpha = \beta$.

General Methodology

The general form of the test statistic that is being used is

$$z_0 = \frac{\hat{T} - E(\hat{T} \mid H_0)}{SE(\hat{T} \mid H_0)}, \qquad (1)$$

[6] This decision rule assumes that the smaller a performance measure is, the better the service. If the opposite is true, then the decision rule should be reversed by using $-Z$ in place of Z.

where

$\hat{T}$ is an estimator that is (approximately) normally distributed,

$E(\hat{T} \mid H_0)$ is the expected value (mean) of $\hat{T}$ under the null hypothesis, and

$SE(\hat{T} \mid H_0)$ is the standard error of $\hat{T}$ under the null hypothesis.

Thus, under the null hypothesis, z_0 follows a standard normal distribution. However, this is not true under the alternative hypothesis. In this case,

$$z_a = \frac{\hat{T} - E(\hat{T} \mid H_a)}{SE(\hat{T} \mid H_a)}$$

has (approximately) a standard normal distribution. Here

$E(\hat{T} \mid H_a)$ is the expected value (mean) of $\hat{T}$ under the alternative hypothesis, and

$SE(\hat{T} \mid H_a)$ is the standard error of $\hat{T}$ under the alternative hypothesis.

Notice that

$$\begin{aligned} \beta &= \mathrm{P}(z_0 > c \mid H_a) \\ &= \mathrm{P}\left(z_a > \frac{cSE(\hat{T} \mid H_0) + E(\hat{T} \mid H_0) - E(\hat{T} \mid H_a)}{SE(\hat{T} \mid H_a)} \right), \end{aligned} \tag{2}$$

and recall that for a standard normal random variable z and a constant b, $\mathrm{P}(z < b) = \mathrm{P}(z > -b)$. Thus,

$$\alpha = \mathrm{P}(z_0 < c) = \mathrm{P}(z_0 > -c). \tag{3}$$

Since we want $\alpha = \beta$, the right hand sides of (2) and (3) represent the same area under the standard normal density. Therefore, it must be the case that

$$-c = \frac{cSE(\hat{T} \mid H_0) + E(\hat{T} \mid H_0) - E(\hat{T} \mid H_a)}{SE(\hat{T} \mid H_a)}.$$

Solving this for c give the general formula for a balancing critical value:

$$c_B = \frac{E(\hat{T} \mid H_a) - E(\hat{T} \mid H_0)}{SE(\hat{T} \mid H_a) + SE(\hat{T} \mid H_0)}. \tag{4}$$

The Balancing Critical Value of the Modified Z for a Mean Measure

The modified Z statistic, *Z*, for a mean measure is given by

$$Z = \frac{\hat{T}}{s_1\sqrt{1/n_1 + 1/n_2}},$$

where $\hat{T} = \overline{X}_1 - \overline{X}_2$, and subscripts 1 and 2 refer to ILEC and CLEC quantities, respectively.

One possible set of hypotheses that take into account the assumption that transaction are identically distributed within LECs, is:

H_0: $\mu_1 = \mu_2$, $\sigma_1^2 = \sigma_2^2$,

H_a: $\mu_2 = \mu_1 + \delta\cdot\sigma_1$, $\sigma_2^2 = \lambda\cdot\sigma_1^2$, where $\delta > 0$ and $\lambda \geq 1$.

Assuming that n_1 is large enough so that s_1 adequately approximates σ_1, we have

$$E(\hat{T} \mid H_0) = 0,$$

$$SE(\hat{T} \mid H_0) = \sigma_1\sqrt{1/n_1 + 1/n_2},$$

$$E(\hat{T} \mid H_a) = -\delta\sigma_1,$$

$$SE(\hat{T} \mid H_a) = \sigma_1\sqrt{1/n_1 + \lambda/n_2}.$$

Substituting these values in equation (4) gives

$$c_B = \frac{-\delta}{\sqrt{1/n_1 + 1/n_2} + \sqrt{1/n_1 + \lambda/n_2}}$$

$$= \frac{-\delta\sqrt{n_1 n_2}}{\sqrt{n_1 + n_2} + \sqrt{\lambda n_1 + n_2}}.$$

The preceding equations have indexed the alternative hypothesis by two parameters, λ and δ. While statistical science can be used to evaluate the impact of different choices of these

parameters, there is not much that an appeal to statistical principles can offer in directing specific choices. Specific choices are best left to telephony experts. Still, it is possible to comment on some aspects of these choices:

Parameter Choice for λ. The parameter λ indexes an alternative to the null hypothesis that arises because there might be greater unpredictability or variability in the delivery of service to a CLEC customer over that which would be achieved for an otherwise comparable ILEC customer. Typically, there is little basis for choosing a value of λ other than 1, in which case the formula for c_B simplifies to

$$c_B = \frac{-\delta\sqrt{n_1 n_2}}{2\sqrt{n_1 + n_2}}.$$

Parameter Choice for δ. The parameter δ is much more important in the choice of the balancing point than was true for λ because it directly indexes the difference in average service.

The Balancing Critical Value of the Modified Z for a Proportion Measure

Specification of a balancing critical value for a proportion measure is more complex than for mean measures because c_B depends directly on both the assumed ILEC and CLEC proportions under H_a not just through a single parameter like δ.

The modified Z statistic for a proportion measure is given by

$$Z = \frac{\hat{T}}{\sqrt{\hat{p}_{ILEC}(1-\hat{p}_{ILEC})}\sqrt{1/n_1 + 1/n_2}},$$

where $\hat{T} = \hat{p}_{ILEC} - \hat{p}_{CLEC}$, and where n_1 and n_2 are the ILEC and CLEC sample sizes, respectively.

The null and alternative hypotheses are specified fully in terms of the true proportions p_{ILEC} and p_{CLEC} as follows:

$$H_0\text{: } p_{ILEC} = p_{CLEC} = p_1 ,$$

$$H_a\text{: } p_{ILEC} = p_1,\ p_{CLEC} = p_2 > p_1.$$

Assuming that n_1 is large enough so that $\hat{p}_{ILEC}(1-\hat{p}_{ILEC})$ adequately approximates $p_{ILEC}(1-p_{ILEC})$, then Z satisfies (1) and we have

$$E(\hat{T} \mid H_0) = 0,$$

$$SE(\hat{T} \mid H_0) = \sqrt{p_1(1-p_1)}\sqrt{1/n_1 + 1/n_2}\ ,$$

$$E(\hat{T} \mid H_a) = p_1 - p_2\,,$$

$$SE(\hat{T} \mid H_a) = \sqrt{p_1(1-p_1)/n_1 + p_2(1-p_2)/n_2}\ .$$

Substituting these values in equation (4) gives

$$c_B = \frac{-(p_2 - p_1)}{\sqrt{p_1(1-p_1)/n_1 + p_2(1-p_2)/n_2} + \sqrt{p_1(1-p_1)}\sqrt{1/n_1 + 1/n_2}}\ .$$

A convenient way to specify the alternative hypothesis is through the "odds ratio" for p_2 and p_1; specifically

$$\varphi = \left(\frac{p_2}{p_1}\right)\left(\frac{1-p_1}{1-p_2}\right),$$

so that

$$p_2 = \left(\frac{\varphi\, p_1}{1 + (\varphi - 1)p_1}\right).$$

The Balancing Critical Value of the Modified Z for a Rate Measure

A rate is a ratio of two counts *num/denom*—e.g., $r_{ILEC} = num_{ILEC}/denom_{ILEC}$. Where the *denom* count is assumed known but the *num* count is subject to sampling variability. Similarly to proportions, the balancing critical value c_B depends directly on the assumed ILEC and CLEC rates under H_a as well as the ILEC and CLEC denominators.

The modified Z statistic for a rate measure is given by

$$Z = \frac{\hat{T}}{\sqrt{\hat{r}_{ILEC}(1/denom_{CLEC} + 1/denom_{ILEC})}}\ .$$

Where $\hat{T} = \hat{r}_{ILEC} - \hat{r}_{CLEC}$.

The null and alternative hypotheses are specified fully in terms of the true proportions r_{ILEC} and r_{CLEC} as follows:

H_0: $r_{ILEC} = r_{CLEC} = r_1$,

H_a: $r_{ILEC} = r_1$, $r_{CLEC} = r_2 > r_1$.

Assuming that $denom_{ILEC}$ is large enough so that $\hat{r}_{ILEC}$ adequately approximates r_{ILEC}, then Z satisfies (1) and we have

$$E(\hat{T} \mid H_0) = 0,$$

$$SE(\hat{T} \mid H_0) = \sqrt{r_{ILEC}(1/denom_{CLEC} + 1/denom_{ILEC})},$$

$$E(\hat{T} \mid H_a) = r_1 - r_2,$$

$$SE(\hat{T} \mid H_a) = \sqrt{r_{CLEC}/denom_{CLEC} + r_{ILEC}/denom_{ILEC})}.$$

Substituting these values in equation (4) gives

$$c_B = \frac{-(r_2 - r_1)}{\sqrt{r_{CLEC}/denom_{CLEC} + r_{ILEC}/denom_{ILEC})} + \sqrt{r_{ILEC}(1/denom_{CLEC} + 1/denom_{ILEC})}}.$$

A convenient way to specify the alternative hypothesis is by

$$r_2 = \varepsilon r_1 .$$