ORIGINAL

M E M O R A N D U M

December 22, 2000

TO: DIVISION OF RECORDS AND REPORTING

FROM: DIVISION OF LEGAL SERVICES (VACCARO) TV

RE: DOCKET NO. 000121-TP - INVESTIGATION INTO THE ESTABLISHMENT OF OPERATIONS SUPPORT SYSTEMS PERMANENT PERFORMANCE MEASURES FOR INCUMBENT LOCAL EXCHANGE TELECOMMUNICATIONS COMPANIES.

Please place the attached document in the above-referenced docket file. This document was mailed out to the parties of record on the attached list.

Thank you.

TV/sa
Attachment

APP ____
CAF ____
CMP ____
COM ____
CTR ____
ECR ____
LEG ____
OPC ____
PAI ____
RGO ____
SEC 1
SER ____
OTH ____

AT&T
Marsha Rule
101 North Monroe Street, Suite 700
Tallahassee FL 32301-1549

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

Birch Telecom of the South, Inc. (NC)
Monica Barone
8001 Fairlake Drive
Wake Forest NC 27587

Florida Cable Telecommunications Assoc., Inc.
Michael A. Gross
246 E. 6th Avenue
Tallahassee FL 32303

Hopping Law Firm
Richard Melson
P.O. Box 6526
Tallahassee FL 32314

Intermedia Communications, Inc.
Mr. Scott Sapperstein
3625 Queen Palm Drive
Tampa FL 33619-1309

ITC^Deltacom
Nanette Edwards/Brian Musselwhite
4092 South Memorial Parkway
Huntsville AL 35802

Katz, Kutter Law Firm
Charles Pellegrini/Patrick Wiggins
12th Floor
106 East College Avenue
Tallahassee FL 32301

Kelley Law Firm
Jonathan Canis/Michael Hazzard
1200 19th St. NW, Fifth Floor
Washington DC 20036

MCI WorldCom
Ms. Donna C. McNulty
325 John Knox Road
The Atrium, Suite 105
Tallahassee FL 32303-4131

McWhirter Law Firm
Joseph McGlothlin/Vicki Kaufman
117 S. Gadsden St.
Tallahassee FL 32301

Pennington Law Firm
Peter Dunbar/Karen Camechis
P.O. Box 10095
Tallahassee FL 32302-2095

Rhythms Links Inc.
Kimberly A. Scardino
Suite 300
1625 Massachusetts Ave., N.W.
Washington DC 20036

Sprint Communications Company Limited Partners
Susan Masterton/Charles Rehwinkel
P.O. Box 2214
MC: FLTLH00107
Tallahassee FL 32316-2214

Blumenfeld & Cohen
Jeremy Marcus/Elizabeth Braman
1625 Massachusetts Ave., NW
Suite 300
Washington, DC 20036

Birch Telecom of the South, Inc.
Tad J. Sauder
2020 Baltimore Avenue
Kansas City, MO 64108-1914

Florida Public Telecommunications Assoc.
Angela Green, General Counsel
125 S. Gadsden St., #200
Tallahassee, FL 32301-1525

Supra Telecom
Wayne Stavanja/Mark Buechele
1311 Executive Center Drive, Suite 200
Tallahassee FL 32301

ime Warner Telecom of Florida, L.P.
arolyn Marek
33 Bramerton Court
anklin TN 37069

/erizon Select Services Inc.
Kimberly Caswell
P.O. Box 110, FLTC0007
Tampa FL 33601-0110

Z-Tel Communications, Inc.
John Rubino/George S. Ford
601 S. Harbour Island Blvd.
Tampa, FL 33602-5706

Covad Communications Company
Catherine F. Boone, Esq.
Regional Counsel
10 Glenlake Parkway, Suite 650
Atlanta, GA 30328-3495

KMC Telecom Inc.
Mr. John D. McLaughlin, Jr.
1755 North Brown Road
Lawrenceville, GA 30043

Florida Public Service Commission
Performance Assessment Plan
Docket 000121-TP

REVISED DRAFT

1.0 Scope

1.1 This document defines the Florida Public Service Commission Staff Proposal for (a) BellSouth Service Quality Measures (SQMs), (b) the Enforcement Measures, (c) Benchmarks and Analogs, (d) Statistical Methodology, and (e) the Enforcement Plan for purposes of Docket No. 000121-TP.

1.2 KPMG Consulting LLC is currently conducting an adequacy review of the BellSouth SQMs in conjunction with the Florida Operations Support System (OSS) test in Docket Nos. 981834-TP and 960786-TL. The SQMs, Enforcement Measures, and the Benchmarks and Analogs recommended here will be readdressed at the conclusion of the Florida OSS test to incorporate any changes or modifications recommended by KPMG.

2.0 Measurement Reporting

2.1 BellSouth will report its performance to individual CLECs and to the Florida Public Service Commission in accordance with the list of SQMs, which are contained in **Exhibit A**.

2.2 BellSouth will report its performance to individual CLECs and the Florida Public Service Commission in accordance with the Enforcement Measures, which are contained in **Exhibit B**.

2.3 BellSouth will make performance data and reports available to individual CLECs on a monthly basis. The reports will contain information collected in each performance category and will be available to CLECs via the BellSouth Interconnection Web site. BellSouth will also provide electronic access to the Performance Monitoring and Analysis Platform raw data underlying the performance measures. BellSouth shall provide detailed instructions regarding access to the reports and to the raw data, as well as the nature of the format of the data provided on the Web site. Monthly reports and data will be posted to the Web site by the 20th calendar day of the following month.

2.4 Section 364.285(1), Florida Statutes, provides that the Florida Public Service Commission shall have the power to impose upon any entity subject to its jurisdiction under Chapter 364, Florida Statutes, which is found to have refused to comply with or to have willfully violated any lawful rule or order of the Commission or any provision of Chapter 364, Florida Statutes, a penalty for each offense of not more than $25,000. Each day that such refusal or violation continues constitutes a separate offense. Collected

penalties shall be paid to the Florida Public Service Commission for deposit in the State General Revenue Fund.

2.5 If performance data and associated reports are not published on the BellSouth Web site by the twentieth (20^{th}) calendar day of each month, each day past the due date shall constitute an admission of a violation of the Commission Order implementing this enforcement plan pursuant to Section 364.285, Florida Statutes, and a penalty of $2,000 will be deemed assessed. BellSouth will be required to pay the penalty to the Florida Public Service Commission for deposit in the State General Revenue Fund within fifteen (15) calendar days of the actual publication date.

2.6 If performance data and reports published on the BellSouth Web site by the twentieth (20^{th}) calendar day of each month are incomplete, or if previously reported data are revised, each day past the due date shall constitute an admission of a violation of the Commission Order implementing this enforcement plan pursuant to Section 364.285, Florida Statutes, and a penalty of $400 will be assessed. BellSouth will be required to pay the penalty within fifteen (15) days of the final publication date or the report revision date, to the Florida Public Service Commission, for deposit in the State General Revenue Fund.

3.0 Modifications to Measures

3.1 During the first two years of implementation, BellSouth will participate in six-month review cycles starting six months after the date of the Florida Public Service Commission order. A collaborative work group, which will include BellSouth, interested CLECs and the Florida Public Service Commission will review the Performance Assessment Plan for additions, deletions or other modifications. After two years from the date of the order, the review cycle may, at the discretion of the Florida Public Service Commission, be reduced to an annual review.

3.2 BellSouth and the CLECs shall file any proposed revisions to the Performance Assessment Plan one month prior to the beginning of each review period.

3.3 From time-to-time, BellSouth may be ordered by the Florida Public Service Commission to modify or amend the Service Quality Measures or Enforcement Measures. Nothing will preclude any party from participating in any proceeding involving BellSouth's Service Quality Measures or Enforcement Measures or from advocating that those measures be modified.

3.4 In the event a dispute arises regarding the ordered modification or amendment to the Service Quality Measures or Enforcement Measures, the parties will refer the dispute to the Florida Public Service Commission.

4.0 Enforcement Mechanisms

4.1 Purpose

This section establishes Enforcement Mechanisms used to verify and maintain parity performance between BellSouth and an individual CLEC's operations as well as to maintain access to Operational Support System functions.

4.2 Effective Date

The Enforcement Mechanisms shall become effective 90 days after the Florida Public Service Commission issues a final order in this case. This time will allow BellSouth to put statistical methods and plans into production.

4.3 Definitions

4.3.1 Enforcement Measurement means the performance measures listed in **Exhibit B**. Enforcement Measures are a subset of the Service Quality Measures used to evaluate BellSouth's performance.

4.3.2 Enforcement Measurement Benchmarks means a competitive level of service used to compare the performance of BellSouth and an individual CLEC where no analogous process, product or service is feasible. Benchmarks are listed in **Exhibit C**.

4.3.3 Enforcement Measurement Analog means comparing performance levels provided to BellSouth retail customers with performance levels provided by BellSouth to the CLEC customer, as set forth in **Exhibit C**.

4.3.4 Test Statistic and Balancing Critical Value is the means by which enforcement will be determined using statistically valid equations. See **Exhibit D**. CLEC performance will be compared to BellSouth performance using a truncated Z statistic. Balancing the critical value balances the probability of Type I and Type II errors. See **Exhibit E** for statistical methodology and technical description.

4.3.5 Cell is the point at which like-to-like comparisons are made. For example, all BellSouth retail POTS services, for residential customers, requiring a dispatch in a particular wire center, at a particular point in time, will be compared directly to a CLEC's resold services for residential customers, requiring a dispatch, in the same wire center, at a particular point in time. When determining compliance, these cells can have a positive or negative value and are compared to the critical value. See **Exhibit D**.

4.3.6 Parity Gap refers to the incremental departure from a compliant level of service. See **Exhibit D**. The parity gap is the difference in the aggregated truncated Z value and the balancing critical value.

4.3.7 Affected Volume means that proportion of the total impacted individual CLEC volume or CLEC aggregate volume for which remedies will be paid.

4.3.8 Delta Value is used to develop the balancing critical value. The difference between the balancing critical value and the truncated Z statistic determines whether or not the measure passed or failed. The delta value also impacts the amount of the remedies that would be paid assuming failures. An initial delta value of .5 for individual CLEC calculations and .35 for aggregated calculations will be used. The delta value for each measure will be reevaluated for materiality concerns during the six-month review cycles described in Section 3.1.

4.3.9 Tier 1 Enforcement Mechanism means self-executing penalties paid directly by BellSouth to an individual CLEC when BellSouth delivers noncompliant performance of any one of the Enforcement Measures for any month.

4.3.10 Tier 2 Enforcement Mechanism means assessments paid directly by BellSouth to the Florida Public Service Commission for deposit in the State General Revenue Fund pursuant to terms set forth in Section 4.4. Tier 2 Enforcement Mechanisms are triggered by a monthly failure in which BellSouth performance is out of compliance or does not meet the benchmarks for the aggregate of all CLEC data for a particular Enforcement Measurement.

4.4 Application

4.4.1 If BellSouth fails to achieve the Enforcement Analogs or Benchmarks specified in this Performance Assessment Plan, each failure shall constitute an admission of a separate violation of the Commission Order implementing this enforcement plan.

4.4.2 Section 364.285(1), Florida Statutes, provides that the Florida Public Service Commission shall have the power to impose upon any entity subject to its jurisdiction under Chapter 364, Florida Statutes, which is found to have refused to comply with or to have willfully violated any lawful rule or order of the Commission or any provision of Chapter 364, Florida Statutes, a penalty for each offense of not more than $25,000. Each day that such refusal or violation continues constitutes a separate offense. Collected penalties shall be paid to the Florida Public Service Commission and deposited in the State General Revenue Fund.

4.4.3 Pursuant to Section 364.285, Florida Statutes, Tier 2 violations will require payment of the associated penalties set forth in Sections 4.5.5 and 4.5.6 to the Florida Public Service Commission for deposit in the State General Revenue Fund.

4.4.4 If a Tier 2 measure fails twice in three consecutive months, BellSouth must perform a root cause analysis and file with the Florida Public Service Commission a corrective action plan within 30 days after the end of the second failed month.

4.4.5 The application of the Tier 1 or Tier 2 Enforcement Mechanisms does not foreclose other legal and regulatory claims and remedies available to CLECs.

4.5 Methodology

Tier 1 Methodology

4.5.1 Tier 1 Enforcement Mechanisms will be triggered by BellSouth's failure to achieve Enforcement Measurement Analogs or Benchmarks for an individual CLEC for a given Enforcement Measurement in a given month based upon a test statistic and balancing critical value calculated by BellSouth utilizing BellSouth generated data. The method of calculation for both analogs and benchmarks is included in **Exhibit D**.

4.5.2 Tier 1 Enforcement Mechanisms apply on a per transaction basis for the affected volume for each submeasure and will escalate based upon the number of consecutive months that BellSouth has reported noncompliance.

4.5.3 Fee Schedule for Tier 1 Enforcement Mechanisms is shown below. Failures beyond Month 6 will be subject to the fees listed in Month 6.

PAYMENTS FOR TIER 1 MEASURES

PER AFFECTED ITEM						
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Ordering	$40	$50	$60	$70	$80	$90
Provisioning	$100	$125	$175	$250	$325	$500
Provisioning UNE (Coordinated Customer Conversions)	$400	$450	$500	$550	$650	$800
Maintenance and Repair	$100	$125	$175	$250	$325	$500
Maintenance and Repair UNE	$400	$450	$500	$550	$650	$800
LNP	$150	$250	$500	$600	$700	$800
IC Trunks	$100	$125	$175	$250	$325	$500
Collocation	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000

Tier 2 Methodology

4.5.4 Tier 2 Enforcement Mechanisms will be triggered by BellSouth's failure to achieve Enforcement Measurement Analogs and Benchmarks for given Enforcement Measures on a month by month basis using BellSouth state aggregate data. The method of calculation for Tier 2 is the same as that described for Tier 1 and is included in **Exhibit D**.

4.5.5 Tier 2 Enforcement Mechanisms apply for an aggregate of all Florida CLEC data, on a per transaction basis, for each submeasure, for a particular Enforcement Measure. The payment will escalate ten (10) percent per month based on the number of consecutive months that BellSouth has reported noncompliance.

4.5.6 Fee Schedule for Tier 2 Enforcement Mechanisms is shown below:

PAYMENTS FOR TIER 2 MEASURES

	Per Affected Item
OSS Pre-Ordering	$20
Ordering	$60
Provisioning	$300
UNE Provisioning (Coordinated Customer Conversions)	$875
Maintenance and Repair	$300
UNE Maintenance and Repair	$875
Billing	$1
LNP	$500
IC Trunks	$500
Collocation	$15,000

4.6 Payment of Tier 1 and Tier 2 Amounts

4.6.1 If BellSouth performance triggers an obligation to pay Tier 1 Enforcement Mechanism penalties to a CLEC or an obligation to remit Tier 2 Enforcement Mechanism penalties to the Florida Public Service Commission for deposit in the State General Revenue Fund, BellSouth shall make payment in the required amount on or before the thirtieth (30^{th}) day following the due date of the performance measurement report for the month in which the obligation arose.

4.6.2 For each day after the due date that BellSouth fails to pay a CLEC the required amount for Tier 1, BellSouth will pay the CLEC six (6) percent simple interest per annum.

4.6.3 Each day after the due date that BellSouth fails to pay penalties under the Tier 2 Enforcement Mechanism shall constitute a separate violation of the Commission Order implementing this enforcement plan, pursuant to Section 364.285, Florida Statutes. BellSouth will pay the Florida Public Service Commission an additional $1,000 per day for deposit into the State General Revenue Fund.

4.6.4 If a CLEC disputes the amount paid to the CLEC under Tier 1 Enforcement Mechanisms, the CLEC shall submit a written claim to BellSouth within sixty (60) days after the date of the performance measurement report for which the obligation arose. BellSouth shall investigate all claims and provide the CLEC written findings within thirty (30) days after receipt of the claim. If BellSouth determines the CLEC is owed additional amounts, BellSouth shall pay the CLEC such additional amounts within thirty (30) days after its findings along with six (6) percent simple interest per annum. However, the CLEC shall be responsible for all administrative costs associated with resolution of disputes that result in no actual payment.

4.6.5 At the end of each calendar year, BellSouth will have its independent auditing and accounting firm certify that all penalties under Tier 1 and Tier 2 Enforcement Mechanisms were paid and accounted for in accordance with Generally Accepted Accounting Principles.

4.7 Limitations of Liability

4.7.1 BellSouth will not be responsible for a CLEC's acts or omissions that cause performance measures to be missed or failed, including but not limited to, accumulation and submission of orders at unreasonable quantities or times or failure to submit accurate orders or inquiries. BellSouth shall provide the CLEC with reasonable notice of such acts or omissions and provide the CLEC with any such supporting documentation.

4.7.2 BellSouth shall not be obligated for penalties under Tier 1 or Tier 2 Enforcement Mechanisms for noncompliance with a performance measure if such noncompliance was the result of an act or omission by the CLEC that was in bad faith.

4.7.3 BellSouth shall not be obligated for penalties under Tier 1 or Tier 2 Enforcement Mechanisms for noncompliance with a performance measurement if such noncompliance was the result of any of the following: a Force Majeure event; an act or omission by a CLEC that is contrary to any of its obligations under its

Interconnection Agreement with BellSouth; an act or omission by a CLEC that is contrary to any of its obligations under the Act, Commission rule, or state law; or an act or omission associated with third-party systems or equipment.

4.8 Enforcement Mechanism Caps

4.8.1 BellSouth's total liability for payments under Tier 1 and Tier 2 Enforcement Mechanisms shall be procedurally capped at 39 percent of net revenues for the state or approximately $337 million.

4.8.2 Within 30 days of exceeding the cap, BellSouth must file a petition with the Florida Public Service Commission for an expedited hearing showing why it should not be required to pay remedies in excess of the procedural cap.

4.8.3 The cap shall apply on a rolling twelve-month period.

4.9 Dispute Resolution

4.9.1 Notwithstanding any other provision of this Agreement, any dispute regarding BellSouth's performance or obligations shall be resolved by the Florida Public Service Commission. Mediation may be available on a case-by-case basis and will not affect a substantially interested person's right to a hearing. If mediation results in the settlement of the dispute, the settlement will be presented to the Commission for consideration.

5.0 Market Penetration Adjustment

BellSouth shall implement a market penetration adjustment for new and advanced services based upon statewide aggregate performance as follows:

5.1 In order to ensure parity and benchmark performance where CLECs order low volumes of advanced and nascent services, BellSouth will make additional voluntary payments to the Florida Public Service Commission for deposit in the State General Revenue Fund. These additional payments will only apply when there are less than 100 observations for those measures listed in Section 5.2 on a statewide basis, subject to the conditions specified in Sections 5.3, 5.4 and 5.5 below.

5.2 The measures applicable to the market penetration adjustment are:

- Percent Missed Installation Appointments
- Average Completion Interval

- Missed Repair Appointments
- Maintenance Average Duration
- Average Response Time for Loop Make-Up Information

Each of these measures will be disaggregated into submeasures as follows:

- UNE Loop and Port Combo
- UNE xDSL
- UNE Line Sharing

5.3 The additional payments referenced above will be made if BellSouth fails to provide the requisite parity or benchmark service for the above measures as determined by the use of the truncated Z statistic and the balancing critical value on a monthly basis. Each failure shall constitute an admission of a violation of the Commission Order implementing this enforcement plan pursuant to Section 364.285, Florida Statutes, and will require payment of the associated penalties set forth in Section 5.4 to the Florida Public Service Commission for deposit in the State General Revenue Fund.

5.4 If during the month there were 100 observations or more for the submeasure, then no additional voluntary payments will be made to the Florida Public Service Commission for deposit in the State General Revenue Fund. However, if during the same month there are less than 100 observations for a submeasure on a statewide basis, then BellSouth shall calculate the additional payments to the Florida Public Service Commission for deposit in the State General Revenue Fund by first applying the normal Tier 2 assessment calculation methodology to that qualifying measurement and then trebling that amount.

5.5 Any payments made are subject to the cap ordered by the Florida Public Service Commission.

6.0 Competitive Entry Volume Adjustment

6.1 In order to ensure that nascent CLECs have an adequate opportunity to establish a market presence, BellSouth will make a higher payment per transaction for the affected submeasure for ordering and provisioning under Tier 1 where the CLEC's volume of total transactions for the submeasure is low, in accordance with Sections 6.2 and 6.3.

6.2 If the CLEC's volume of total transactions for a submeasure is equal to or less than 25, the payment per affected item specified in Section 4.5.3 will be trebled.

6.3 If the CLEC's volume of total transactions for a submeasure is less than 50 but more than 25, the payment per affected item specified in Section 4.5.3 will be doubled.

7.0 Auditing Measurement Data

7.1 BellSouth will agree to undergo a comprehensive audit of the aggregate level reports for both BellSouth and the CLEC(s) current year data for each of the next five (5) years (2001 – 2006), to be conducted by an independent third party. The results of that audit will be made available to all the parties subject to proper safeguards to protect proprietary information.

7.2 The cost of the comprehensive audit shall be borne by BellSouth.

7.3 The independent third-party auditor shall be selected with input from BellSouth and the Florida Public Service Commission.

7.4 BellSouth and the Florida Public Service Commission shall jointly determine the scope of the audit considering input from the CLECs.

7.5 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, a CLEC should have the right to a review performed by BellSouth on specific measures and/or submeasures upon written request. If within thirty (30) days of the written request, the issue has not been resolved, the CLEC may, at its own expense, commence a focused audit by an independent third party upon providing BellSouth with five (5) business days advance notice.

7.6 BellSouth shall retain data that supports performance measure results for a rolling month period.

EXHIBIT A

SERVICE QUALITY MEASURES

EXHIBIT A
BellSouth Telecommunications
Florida Service Quality Measures

CATEGORY	MEASUREMENT DESCRIPTION
(OSS) Operations Support Systems	OSS-1. Average Response Time and Response Interval (Pre-Ordering/Ordering) OSS-2. Interface Availability (Pre-Ordering) OSS-3. Interface Availability (Maintenance & Repair) OSS-4. Response Interval (Maintenance & Repair) OSS-5 Percent Response Received Within "x" Seconds
(O) Ordering	O-1. Percent Flow-through Service Requests (Summary) O-2. Percent Flow-through Service Requests (Detail) O-3. Flow-through Error Analysis O-4. CLEC LSR Information LSR Flow-Through Matrix O-5. Percent Rejected Service Requests O-6. Reject Interval O-7. Firm Order Confirmation Timeliness O-8. Speed of Answer in Ordering Center O-9. LNP-Percent Rejected Service Request O-10. LNP-Reject Interval Distribution & Average Reject Internal O-11. LNP-Firm Order Confirmation Timeliness Interval Distribution & Firm Order Confirmation Average Interval O-12. Acknowledgement Timeliness O-13 Acknowledgement Completeness O-14 Loop Make Up Information Average Response Time
(P) Provisioning	P-1. Mean Held Order Interval & Distribution Intervals P-2. Average Jeopardy Notice Interval & Percentage of Orders Given Jeopardy Notices P-3. Percent Missed Installation Appointments P-4. Average Completion Interval (OCI) & Order Completion Interval Distribution P-5. Average Completion Notice Interval P-6. Coordinated Customer Conversions Interval P-6A. Coordinated Customer Conversions Hot Cut Timeliness % within Interval and Average Interval P-7. % Provisioning Troubles w/i 30 days of Service Order Completion P-8. Total Service Order Cycle Time (TSOCT) P-9. LNP –Percent Missed Installation Appointments P-10. LNP-Average Disconnect Timeliness Interval & Disconnect Timeliness Interval Distribution P-11. LNP-Total Service Order Cycle Time
(M&R) Maintenance & Repair	M&R-1. Missed Repair Appointments M&R-2. Customer Trouble Report Rate M&R-3. Maintenance Average Duration M&R-4. Percent Repeat Troubles w/i 30 days M&R-5. Out of Service > 24 Hours M&R-6. Average Answer Time - Repair Centers
(B) Billing	B-1. Invoice Accuracy B-2. Mean Time to Deliver Invoices B-3. Usage Data Delivery Accuracy B-4. Usage Data Delivery Completeness B-5. Usage Data Delivery Timeliness B-6. Mean Time to Deliver Usage

EXHIBIT A
BellSouth Telecommunications
Florida Service Quality Measures

CATEGORY	MEASUREMENT DESCRIPTION
(OS) (DA) Operator Services Toll & Directory Assistance	OS-1. Speed to Answer Performance/Average Speed to Answer (Toll) OS-2. Speed to Answer Performance/Percent Answered within "X" Seconds (Toll) DA-1. Speed to Answer Performance/Average Speed to Answer (DA) DA-2. Speed to Answer Performance/Percent Answered within "X" Seconds (DA)
(E) E911	E-1. Timeliness E-2. Accuracy E-3. Mean Interval
(TGP) Trunk Group Performance	TGP-1. Trunk Group Performance-Aggregate TGP-2. Trunk Group Performance-CLEC Specific TGP-3. Trunk Group Service Report TGP-4. Trunk Group Service Detail
(C) Collocation	C-1. Average Response Time C-2. Average Arrangement Time C-3. Percent of Due Dates Missed
(CM) Change Management	CM-1 Timeliness of Change Management Notices CM-2 Average Delay Days for Change Management Notices CM-3 Timeliness of Documents Associated with Change CM-4 Average Delay Days for Documentation

Note: The detailed business rules for these SQM's will be consistent with those adopted by the Florida Public Service Commission as Interim metrics for the purpose of OSS testing unless otherwise specified.

Additional Measures Under Consideration

KPMG is currently conducting an adequacy review of the BellSouth SQM's as part of the Florida OSS test. As a part of that evaluation KPMG Consulting LLC is determining the need for any of the additional measures listed below.

1. Percent Service Loss from Early and Late Cuts
2. Percent of Hot Cuts Not Working When Initially Provisioned
3. Percent Completions or Attempts without Notice or with less than 24 hours Notice
4. Percent Order Accuracy
5. Percent of Orders Canceled or Supplemented at the Request of BellSouth
6. Percent and Timeliness of EDI and TAG LSR acknowledgements
7. Provisioning Troubles prior to Loop Acceptance
8. Percent Orders Canceled after Missed Due Date
9. Percent Found OK/test OK/CPE
10. CLEC Center Call Abandonment Rate
11. Average Notification of Interface / OSS Outage
12. Percent of Change Management Notices and Documentation Sent on Time
13. Percent of Software Certification Failures and Software Problem Resolution
14. Percent Billing Errors Corrected in X Days
15. Loop Make Up Information Timeliness
16. Provisioning Trouble Reports Prior to Service Order Completion
17. Coordinated Customer Conversions as Percentage on Time
18. Service Inquiry with Firm Order (Manual)
19. Percent Troubles within 7 days of a Hot Cut

Note that KPMG is also evaluating the appropriateness of levels of disaggregation. Additionally they will conduct a special study of end-to-end timing of several transactions, including Average OSS Response Time, Reject Interval, and Firm Order Commitment Timeliness

EXHIBIT B

ENFORCEMENT MEASURES

EXHIBIT B

BellSouth Telecommunications
Florida Enforcement Measures
TIER 1 and 2

CATEGORY	MEASUREMENT DESCRIPTION
(OSS) Operations Support Systems	OSS-1. Average Response Time and Response Interval (Pre-Ordering/Ordering) **(Tier 2 Only)** OSS-2. Interface Availability (Pre-Ordering) **(Tier 2 Only)**
(O) Ordering	O-1. Percent Flow-through Service Requests (Summary) **(Tier 2 Only)** *(Residential, Business, UNE, LNP)* O-2. Percent Flow-through Service Requests (Detail) **(Tier 1 Only)** *(Residential, Business, UNE, LNP)* O-6. Reject Interval *(Mechanized, Partially Mechanized, Non-mechanized)* O-7. Firm Order Confirmation Timeliness *(Mechanized, Partially Mechanized, Non-mechanized)* O-14 Loop Make Up Information Average Response Time *(Manual, Electronic)*
(P) Provisioning	P-3. Percent Missed Installation Appointments* P-4. Average Completion Interval (OCI) & Order Completion Interval Distribution * P-6. Coordinated Customer Conversions Interval P-6A. Coordinated Customer Conversions Hot Cut Timeliness % within Interval and Average Interval P-7. Percent Provisioning Troubles w/i 30 days of Service Order Completion* P-9. LNP –Percent Missed Installation Appointments P-10. LNP-Average Disconnect Timeliness Interval & Disconnect Timeliness Interval Distribution
(M&R) Maintenance & Repair	M&R-1. Missed Repair Appointments * M&R-2. Customer Trouble Report Rate * M&R-3. Maintenance Average Duration * M&R-4. Percent Repeat Troubles w/I 30 days) *
(B) Billing	B-1. Invoice Accuracy B-2. Mean Time to Deliver Invoices B-3. Usage Data Delivery Accuracy B-5. Usage Data Delivery Timeliness
(TGP) Trunk Group Performance	TGP-1. Trunk Group Performance-Aggregate **(Exclude from Tier 1 Measures)** TGP-2. Trunk Group Performance-CLEC Specific **(Exclude from Tier 2 Measures)**
(C) Collocation	C-3. Percent of Due Dates Missed
(CM) Change Management	CM-1 Timeliness of Change Management Notices **(Tier 2 Only)**

Note: The detailed business rules for these SQMS's will be consistent with those adopted by the Florida Public Service Commission as Interim metrics for the purpose of OSS testing unless otherwise specified.

* .The level of disaggregation for these measures shall be:

a) Resale POTS Residence
b) Resale POT Business
c) Resale Design
d) UNE Design
e) UNE NonDesign
f) UNE Loop and Port Combo
g) UNE Loops
h) UNE xDSL
i) UNE Line Sharing
j) Interconnection Trunks

Unless otherwise noted in this Exhibit the level of dissaggregation for Tier 1 and Tier 2 measures are describe in Exhibit A.

EXHIBIT C

ANALOGS AND BENCHMARKS

Exhibit C
Florida Enforcement Analogs and Benchmarks

	MEASURES AND SUBMEASURES	RETAIL ANALOG RESALE AND UNES	BENCHMARK
Pre-Ordering	OSS-1 Average Response Time	Parity with Retail	
	OSS-2 OSS Interface Availability		≥ 99.5%
Ordering	O-1 Percent Flow-Through Service Request (Summary) Residential Business UNE LNP		 ≥ 90% ≥ 80% ≥ 80% ≥ 80%
	O-2 Percent Flow-Through Service Request (Detail) Residential Business UNE LNP		 ≥ 90% ≥ 80% ≥ 80% ≥ 80%
	O-6 Reject Interval Mechanized Partially Mechanized Non-Mechanized		 97% ≤ 1 hr 85% ≤ 10 hrs 85% ≤ 24 hrs
	O-7 Firm Order Confirmation Timeliness Mechanized Partially Mechanized Non-Mechanized		 95% ≤ 3 hrs 85% ≤ 10 hrs 85% ≤ 36 hrs
	O-14 Loop Make Up Information Average Response Time Manual Electronic		 95% ≤ 3 bus dys 95% ≤ 1 min
Provisioning	P-3 Percent Missed Installation Appointments – Resale POTS	Parity with Retail POTS	
	P-3 Percent Missed Installation Appointments – Resale Design	Parity with Retail Design	
	P-3 Percent Missed Installation Appointments – UNE Loop and Port Combos	Retail Residence and Business [1]	
	P-3 Percent Missed Installation Appointments – UNE Loops	Design: Retail Design [1] Non-Design: Retail Res, Bus [1]	
	P-3 Percent Missed Installation Appointments – UNE xDSL	Parity with Retail Design	
	P-3 Percent Missed Installation Appointments – UNE Line Sharing	ADSL Provide to Retail	
	P-3 Percent Missed Installation Appointments – IC Trunks	Parity with Retail	
	P-4 Order Completion Interval – Resale POTS	Parity with Retail POTS	
	P-4 Order Completion Interval – Resale Design	Parity with Retail Design	
	P-4 Order Completion Interval – UNE Loop & Port Combos	Retail Residence and Business [1]	

	MEASURES AND SUBMEASURES	RETAIL ANALOG RESALE AND UNES	BENCHMARK
	P-4 Order Completion Interval – UNE Loops	Design: Retail Design Dispatch 'w' Orders [1] Non-Design: Retail Residence and Business POTS	
	P-4 Order Completion Interval – UNE xDSL		7 days w/o conditioning 14 days w/conditioning
	P-4 Order Completion Interval – UNE Line Sharing	ADSL Provide to Retail	
	P-4 Order Completion Interval – IC Trunks	Parity with Retail	
	P-6 Coordinated Customer Conversion Interval		95% ≤ 15 min
	P-6A Coordinated Customer Conversion Hot Cut Timeliness Percent within Interval and Average Interval		95% w/l + or – 15 min of sched start time
	P-7 Percent Provisioning Troubles within 30 Days – Resale POTS	Parity with Retail POTS	
	P-7 Percent Provisioning Troubles within 30 Days – Resale Design	Parity with Retail Design	
	P-7 Percent Provisioning Troubles within 30 Days - UNE Loop and Port Combos	Retail Residence and Business [1]	
	P-7 Percent Provisioning Troubles within 30 Days - UNE Loops	Design: Retail Design [1] Non-Design: Retail Res, Bus [1]	
	P-7 Percent Provisioning Troubles within 30 Days – UNE xDSL	Parity with Retail Design	
	P-7 Percent Provisioning Troubles within 30 Days – UNE Line Sharing	ADSL Provide to Retail	
	P-7 Percent Provisioning Troubles within 30 Days – IC Trunks	Parity with Retail	
	P-9 LNP – Percent Missed Installation Appointments	Retail Residentce and Business	
	P-10 LNP-Average Disconnect Timeliness Interval & Disconnect Timeliness Interval Distribution		95% ≤ 15 min
Maintenance	M&R-1 Percent Missed Repair Appointments – Resale POTS	Parity with Retail POTS	
	M&R-1 Percent Missed Repair Appointments – Resale Design	Parity with Retail Design	
	M&R-1 Percent Missed Repair Appointments – UNE Loop and Port Combos	Retail Residence and Business [1]	
	M&R-1 Percent Missed Repair Appointments – UNE Loops	Design: Retail Design [1] Non-Design: Retail Res, Bus [1]	
Maintenance Continued	M&R-1 Percent Missed Repair Appointments – UNE xDSL	Parity with Retail Design	
	M&R-1 Percent Missed Repair Appointments – UNE Line Sharing	ADSL Provide to Retail	
	M&R-1 Percent Missed Repair Appointments – IC Trunks	Parity with Retail	
	M&R-2 Customer Trouble Report Rate – Resale POTS	Parity with Retail POTS	
	M&R-2 Customer Trouble Report Rate – Resale Design	Parity with Retail Design	
	M&R-2 Customer Trouble Report Rate – UNE Loop and Port Combos	Retail Residence and Business [1]	

	MEASURES AND SUBMEASURES	RETAIL ANALOG RESALE AND UNES	BENCHMARK
	M&R-2 Customer Trouble Report Rate - UNE Loops	Design: Retail Design [1] Non-Design: Retail Res, Bus [1]	
	M&R-2 Customer Trouble Report Rate – UNE xDSL	Parity with Retail Design	
	M&R-2 Customer Trouble Report Rate – UNE Line Sharing	ADSL Provide to Retail	
	M&R-2 Customer Trouble Report Rate – IC Trunks	Parity with Retail	
	M&R-3 Maintenance Average Duration – Resale POTS	Parity with Retail POTS	
	M&R-3 Maintenance Average Duration – Resale Design	Parity with Retail Design	
	M&R-3 Maintenance Average Duration - UNE Loop and Port Combos	Retail Residence and Business [1]	
	M&R-3 Maintenance Average Duration - UNE Loops	Design: Retail Design [1] Non-Design: Retail Res, Bus [1]	
	M&R-3 Maintenance Average Duration – UNE xDSL	Parity with Retail Design	
	M&R-3 Maintenance Average Duration – UNE Line Sharing	ADSL Provide to Retail	
	M&R-3 Maintenance Average Duration – UNE IC Trunks	Parity with Retail	
	M&R-4 Percent Repeat Troubles within 30 Days – Resale POTS	Parity with Retail POTS	
	M&R-4 Percent Repeat Troubles within 30 Days – Resale Design	Parity with Retail Design	
	M&R-4 Percent Repeat Troubles within 30 Days - UNE Loop and Port Combos	Retail Residence and Business [1]	
	M&R-4 Percent Repeat Troubles within 30 Days - UNE Loops	Design: Retail Design [1] Non-Design: Retail Res, Bus [1]	
	M&R-4 Percent Repeat Troubles within 30 Days – UNE xDSL	Parity with Retail Design	
	M&R-4 Percent Repeat Troubles within 30 Days – UNE Line Sharing	ADSL Provide to Retail	
	M&R-4 Percent Repeat Troubles within 30 Days - IC Trunks	Parity with Retail	
Billing	B-1 Invoice Accuracy	Parity with Retail	
	B-2 Mean Time To Deliver Invoices	Parity with Retail	
	B-3 Usage Data Delivery Accuracy	Parity with Retail	
Trunk Performance	TGP-1 Trunk Group Performance – Aggregate	Retail Trunk Group Category #9	
	TGP-2 Trunk Group Performance – CLEC Specific	Retail Trunk Group Category #9	
Collocation	C-3 Percent of Due Dates Missed		≤ 5%
Change Management	CM-1 Timeliness of Change Management Notices		98% on time

NOTES: [1] The retail analog for UNE Non-Design is the average of all dispatch retail residence and dispatch retail business transactions for the particular month. The retail analog for UNE Design is calculated similarly using dispatch retail design results.

EXHIBIT D

CALCULATION PROCEDURES

EXHIBIT D
CALCULATION PROCEDURE

TIER 1 CALCULATION FOR RETAIL ANALOGUES

1. Calculate the overall test statistic for each CLEC; z^{T}_{CLEC1} (See Exhibit E)
2. Calculate the balancing critical value($^{C}B_{CLEC1}$) that is associated with the alternative hypothesis (for fixed parameters δ, ψ or ε). (See Exhibit E)
3. If the overall test statistic is equal to or above the balancing critical value, stop here. That is, if $^{C}B_{CLEC1} < z^{T}_{CLEC1}$, stop here. Otherwise, go to step 4.
4. Calculate the Parity Gap by subtracting the value of step 2. from that of step 1.; $z^{T}_{CLEC1} - {}^{C}B_{CLEC1}$
5. Calculate the Volume Proportion using a linear distribution with slope of ¼. This can be accomplished by taking the absolute value of the Parity Gap from step 4. Divided by 4; $ABS((z^{T}_{CLEC1} - {}^{C}B_{CLEC1}) / 4)$. All parity gaps equal or greater to 4 will result in a volume proportion of 100%.
6. Calculate the Affected Volume by multiplying the Volume Proportion from step 5. by the Total Impacted $CLEC_1$ Volume (I_c) in the negatively affected cell; where the cell value is negative. (See Exhibit E)
7. Calculate the payment to the CLEC by multiplying the result of step 6. by the appropriate dollar amount from the fee schedule.

So, CLEC payment = $\text{Affected Volume}_{CLEC1}$ * $$ from Fee Schedule

Example: CLEC-1 Missed Installation Appointments (MIA) for Resale POTS

	n_I	n_C	I_c	MIA_I	MIA_C	Z^{I}_{CLEC1}	C_B	**Parity Gap**	Volume Proportion	Affected Volume
State	50000	600	96	9%	16%	-1.92	-0.21	**1.71**	0.4275	
Cell						Z_{CLEC1}				
1		150	17	0.091	0.113	-1.994				8
2		75	8	0.176	0.107	0.734				
3		10	4	0.128	0.400	-2.619				2
4		50	17	0.158	0.340	-2.878				8
5		15	2	0.245	0.133	1.345				
6		200	26	0.156	0.130	0.021				
7		30	7	0.166	0.233	-0.600				3
8		20	3	0.106	0.150	-0.065				2
9		40	9	0.193	0.225	-0.918				4
10		10	3	0.160	0.300	-0.660				2
										29

where n_I = ILEC observations and n_C = CLEC-1 observations

Payout for CLEC-1 is (29 units) * ($100/unit) = $2,900

Example: CLEC-1 Order Completion Interval (OCI) for Resale POTS

	n_I	n_C	l_c	OCI_I	OCI_C	Z'_{CLEC1}	C_B	**Parity Gap**	Volume Proportion	Affected Volume
State	50000	600	600	5days	7days	-1.92	-0.21	**1.71**	0.4275	
Cell						Z_{CLEC1}				
1		150	150	5	7	-1.994				64
2		75	75	5	4	0.734				
3		10	10	2	3.8	-2.619				4
4		50	50	5	7	-2.878				21
5		15	15	4	2.6	1.345				
6		200	200	3.8	2.7	0.021				
7		30	30	6	7.2	-0.600				13
8		20	20	5.5	6	-0.065				9
9		40	40	8	10	-0.918				17
10		10	10	6	7.3	-0.660				4
										133

where n_I = ILEC observations and n_C = CLEC-1 observations

Payout for CLEC-1 is (133 units) • ($100/unit) = $13,300

TIER 2 CALCULATION for RETAIL ANALOGUES:

1. Tier 2 is triggered by failures in a given month of any Enforcement Measurement submeasure.

2. Therefore, calculate monthly statistical results and affected volumes as outlined in steps 2. through 6. for the CLEC Aggregate performance.

3. Calculate the payment to Florida Public Service Commission for deposit in the State General Revenue Fund by totaling monthly affected volume and multiplying the result by the appropriate dollar amount from the Tier 2 fee schedule.

   So, the Florida Public Service Commission payment
   $= \Sigma$ (Affected $Volume_{CLECA}$ for the month) * $$ from Fee Schedule

Example: CLEC-A Missed Installation Appointments (MIA) for Resale POTS

State	n_I	n_C	I_c	MIA_I	MIA_C	Z'_{CLECA}	C_B	**Parity Gap**	Volume Proportion	Affected Volume
Month1	180000	2100	336	9%	16%	-1.92	-0.21	**1.71**	0.4275	
Cell						Z_{CLECA}				
1		500	56	0.091	0.112	-1.994				24
2		300	30	0.176	0.100	0.734				
3		80	27	0.128	0.338	-2.619				12
4		205	60	0.158	0.293	-2.878				26
5		45	4	0.245	0.089	1.345				
6		605	79	0.156	0.131	0.021				
7		80	19	0.166	0.238	-0.600				9
8		40	6	0.106	0.150	-0.065				3
9		165	36	0.193	0.218	-0.918				16
10		80	19	0.160	0.238	-0.660				9
										99

where n_I = ILEC observations and n_C = CLEC-A observations

Payout for CLEC-A is (99 units) * ($300/unit) = $29,700

TIER 1 CALCULATION FOR BENCHMARKS:

1. For each CLEC, with five or more observations, calculate monthly performance results for the State.

2. CLECs having observations (sample sizes) between 5 and 30 will use Table I below. The only exception will be for Collocation Percent Missed Due Dates.

Table I **Small Sample Size Table**
(95% Confidence)

Sample Size	Equivalent 90% Benchmark	Equivalent 95% Benchmark	Sample Size	Equivalent 90% Benchmark	Equivalent 95% Benchmark
5	60.00%	80.00%	16	75.00%	87.50%
6	66.67%	83.33%	17	76.47%	82.35%
7	71.43%	85.71%	18	77.78%	83.33%
8	75.00%	75.00%	19	78.95%	84.21%
9	66.67%	77.78%	20	80.00%	85.00%
10	70.00%	80.00%	21	76.19%	85.71%
11	72.73%	81.82%	22	77.27%	86.36%
12	75.00%	83.33%	23	78.26%	86.96%
13	76.92%	84.62%	24	79.17%	87.50%
14	78.57%	85.71%	25	80.00%	88.00%
15	73.33%	86.67%	26	80.77%	88.46%
			27	81.48%	88.89%
			28	78.57%	89.29%
			29	79.31%	86.21%
			30	80.00%	86.67%

3. If the percentage (or equivalent percentage for small samples) meets the benchmark standard, stop here. Otherwise, go to step 4.

4. Determine the Volume Proportion by taking the difference between the benchmark and the actual performance result.

5. Calculate the Affected Volume by multiplying the Volume Proportion from step 4. by the Total Impacted $CLEC_1$ Volume.

6. Calculate the payment to the CLEC by multiplying the result of step 5. by the appropriate dollar amount from the fee schedule.

So, CLEC payment = Affected $Volume_{CLEC1}$ * $$ from Fee Schedule

Example: CLEC-1 Percent Missed Due Dates for Collocations

	n_C	Benchmark	MIA_C	Volume Proportion	Affected Volume
State	600	10%	13%	.03	18

Payout for CLEC-1 is (18 units) * ($5000/unit) = $90,000

TIER 1 CALCULATION FOR BENCHMARKS WITH TARGETS

1. For each, CLEC, with five or more observations, calculate monthly performance results for the State.

2. CLECs having observations (sample sizes) between 5 and 30 will use Table I above.

3. Calculate the interval distribution based on the same data set used in step 1.

4. If the 'percent within' (or equivalent percentage for small samples) meets the benchmark standard, stop here. Otherwise, go to step 5.

5. Determine the Volume Proportion by taking the difference between benchmark and the actual performance result.

6. Calculate the Affected Volume by multiplying the Volume Proportion from step 5. by the Total $CLEC_1$ Volume.

7. Calculate the payment to the CLEC by multiplying the result of step 6. by the appropriate dollar amount from the fee schedule.

So, CLEC payment = Affected $Volume_{CLEC1}$ * $$ from Fee Schedule

Example: CLEC-1 Reject Timeliness

	n_C	Benchmark	Reject $Timeliness_C$	Volume Proportion	Affected Volume
State	600	95% within 1 hour	93% within 1 hour	.02	12

Payout for CLEC-1 is (12 units) * ($100/unit) = $1,200

TIER 2 CALCULATIONS for BENCHMARKS:

Tier 2 calculations for benchmark measures are the same as the Tier 1 benchmark calculations except the CLEC Aggregate data having failed for the given month being assessed.

EXHIBIT E

STATISTICAL METHODOLOGY
AND
TECHNICAL APPENDIX

EXHIBIT E
Statistical Methods for Performance Measure Analysis

I. Necessary Properties for a Test Methodology

The statistical process for testing if competing local exchange carriers (CLECs) customers are being treat equally with BellSouth (BST) customers involves more than just a mathematical formula. Three key elements need to be considered before an appropriate decision process can be developed. These are

- the type of data,
- the type of comparison, and
- the type of performance measure.

Once these elements are determined a test methodology should be developed that complies with the following properties.

- Like-to-Like Comparisons. When possible, data should be compared at appropriate levels, e.g. wire center, time of month, dispatched, residential, new orders. The testing process should:
  - Identify variables that may affect the performance measure.
  - Record these important confounding covariates.
  - Adjust for the observed covariates in order to remove potential biases and to make the CLEC and the ILEC units as comparable as possible.
- Aggregate Level Test Statistic. Each performance measure of interest should be summarized by one overall test statistic giving the decision maker a rule that determines whether a statistically significant difference exists. The test statistic should have the following properties.
  - The method should provide a single overall index, on a standard scale.
  - If entries in comparison cells are exactly proportional over a covariate, the aggregated index should be very nearly the same as if comparisons on the covariate had not been done.
  - The contribution of each comparison cell should depend on the number of observations in the cell.
  - Cancellation between comparison cells should be limited.
  - The index should be a continuous function of the observations.
- Production Mode Process. The decision system must be developed so that it does not require intermediate manual intervention, i.e. the process must be a "black box."
  - Calculations are well defined for possible eventualities.
  - The decision process is an algorithm that needs no manual intervention.
  - Results should be arrived at in a timely manner.
  - The system must recognize that resources are needed for other performance measure-related processes that also must be run in a timely manner.
  - The system should be auditable, and adjustable over time.
- Balancing. The testing methodology should balance Type I and Type II Error probabilities.
  - P(Type I Error) = P(Type II Error) for well defined null and alternative hypotheses.
  - The formula for a test's balancing critical value should be simple enough to calculate using standard mathematical functions, i.e. one should avoid methods that require computationally intensive techniques.

- Little to no information beyond the null hypothesis, the alternative hypothesis, and the number of observations should be required for calculating the balancing critical value.

- Trimming. Trimming of extreme observations from BellSouth and CLEC distributions is needed in order to ensure that a fair comparison is made between performance measures. Three conditions are needed to accomplish this goal. These are:

  - Trimming should be based on a general rule that can be used in a production setting.

  - Trimmed observations should not simply be discarded; they need to be examined and possibly used in the final decision making process.

  - Trimming should only be used on performance measures that are sensitive to "outliers."

Measurement Types

The performance measures that will undergo testing are of four types:

1) means
2) proportions,
3) rates, and
4) ratio

While all four have similar characteristics, proportions and rates are derived from count data while means and ratios are derived from interval measurements. Table 2 classifies the performance measures by the type of measurement.

II. Testing Methodology – The Truncated Z

Many covariates are chosen in order to provide deep comparison levels. In each comparison cell, a Z statistic is calculated. The form of the Z statistic may vary depending on the performance measure, but it should be distributed approximately as a standard normal, with mean zero and variance equal to one. Assuming that the test statistic is derived so that it is negative when the performance for the CLEC is worse than for the ILEC, a positive truncation is done – i.e. if the result is negative it is left alone, if the result is positive it is changed to zero. A weighted average of the truncated statistics is calculated where a cell weight depends on the volume of BST and CLEC orders in the cell. The weighted average is re-centered by the theoretical mean of a truncated distribution, and this is divided by the standard error of the weighted average. The standard error is computed assuming a fixed effects model.

Proportion Measures

For performance measures that are calculated as a proportion, in each adjustment cell, the truncated Z and the moments for the truncated Z can be calculated in a direct manner. In adjustment cells where proportions are not close to zero or one, and where the sample sizes are reasonably large, a normal approximation can be used. In this case, the moments for the truncated Z come directly from properties of the standard normal distribution. If the normal approximation is not appropriate, then the Z statistic is calculated from the hypergeometric distribution. In this case, the moments of the truncated Z are calculated exactly using the hypergeometric probabilities.

Rate Measures

The truncated Z methodology for rate measures has the same general structure for calculating the Z in each cell as proportion measures. For a rate measure, there are a fixed number of circuits or units for the CLEC, n_{2j} and a fixed number of units for BST, n_{1j}. Suppose that the performance measure is a "trouble rate." The modeling assumption is that the occurrence of a trouble is independent between units and the number of troubles in n circuits follows a Poisson distribution with mean λ n where λ is the probability of a trouble in 1 circuit and n is the number of circuits.

In an adjustment cell, if the number of CLEC troubles is greater than 15 and the number of BST troubles is greater than 15, then the Z test is calculated using the normal approximation to the Poisson. In this case, the moments of the truncated Z come directly from properties of the standard normal distribution. Otherwise, if

there are very few troubles, the number of CLEC troubles can be modeled using a binomial distribution with n equal to the total number of troubles (CLEC plus BST troubles.) In this case, the moments for the truncated Z are calculated explicitly using the binomial distribution.

Mean Measures

For mean measures, an adjusted t statistic is calculated for each like-to-like cell which has at least 7 BST and 7 CLEC transactions. A permutation test is used when one or both of the BST and CLEC sample sizes is less than 6. Both the adjusted t statistic and the permutation calculation are described in the technical appendix.

Ratio Measures

Rules will be given for computing a cell test statistic for a ratio measure, however, the current plan for measures in this category, namely billing accuracy, does not call for the use of a Z parity statistic.

EXHIBIT E

TECHNICAL APPENDIX

EXHIBIT E
TECHNICAL APPENDIX

We start by assuming that any necessary trimming[1] of the data is complete, and that the data are disaggregated so that comparisons are made within appropriate classes or adjustment cells that define "like" observations.

Notation and Exact Testing Distributions

Below, we have detailed the basic notation for the construction of the truncated z statistic. In what follows the word "cell" should be taken to mean a like-to-like comparison cell that has both one (or more) ILEC observation and one (or more) CLEC observation.

L = the total number of occupied cells

j = $1,\ldots,L$; an index for the cells

n_{1j} = the number of ILEC transactions in cell j

n_{2j} = the number of CLEC transactions in cell j

n_j = the total number transactions in cell j; $n_{1j}+ n_{2j}$

X_{1jk} = individual ILEC transactions in cell j; $k = 1,\ldots, n_{1j}$

X_{2jk} = individual CLEC transactions in cell j; $k = 1,\ldots, n_{2j}$

Y_{jk} = individual transaction (both ILEC and CLEC) in cell j

$$= \begin{cases} X_{1jk} & k = 1,\ldots,n_{1j} \\ X_{2jk} & k = n_{1j}+1,\ldots,n_j \end{cases}$$

$\Phi^{-1}(\cdot)$ = the inverse of the cumulative standard normal distribution function

For Mean Performance Measures the following additional notation is needed.

$\overline{X}_{1j}$ = the ILEC sample mean of cell j

$\overline{X}_{2j}$ = the CLEC sample mean of cell j

s_{1j}^2 = the ILEC sample variance in cell j

s_{2j}^2 = the CLEC sample variance in cell j

$\{y_{jk}\}$ = a random sample of size n_{2j} from the set of $Y_{j1},\ldots,Y_{jn_j}$; $k = 1,\ldots,n_{2j}$

M_j = the total number of distinct pairs of samples of size n_{1j} and n_{2j};

---

[1] When it is determined that a measure should be trimmed, a trimming rule that is easy to implement in a production setting is:

Trim the ILEC observations to the largest CLEC value from all CLEC observations in the month under consideration.

That is, no CLEC values are removed; all ILEC observations greater than the largest CLEC observation are trimmed.

$$= \binom{n_j}{n_{1j}}$$

The exact parity test is the permutation test based on the "modified Z" statistic. For large samples, we can avoid permutation calculations since this statistic will be normal (or Student's t) to a good approximation. For small samples, where we cannot avoid permutation calculations, we have found that the difference between "modified Z" and the textbook "pooled Z" is negligible. We therefore propose to use the permutation test based on pooled Z for small samples. This decision speeds up the permutation computations considerably, because for each permutation we need only compute the sum of the CLEC sample values, and not the pooled statistic itself.

A permutation probability mass function distribution for cell j, based on the "pooled Z" can be written as

$$PM(t) = P(\sum_k y_{jk} = t) = \frac{\textit{the number of samples that sum to } t}{M_j},$$

and the corresponding cumulative permutation distribution is

$$CPM(t) = P(\sum_k y_{jk} \le t) = \frac{\textit{the number of samples with sum } \le t}{M_j}.$$

For Proportion Performance Measures the following notation is defined

a_{1j}= the number of ILEC cases possessing an attribute of interest in cell j

a_{2j}= the number of CLEC cases possessing an attribute of interest in cell j

a_j = the number of cases possessing an attribute of interest in cell j; $a_{1j} + a_{2j}$

The exact distribution for a parity test is the hypergeometric distribution. The hypergeometric probability mass function distribution for cell j is

$$HG(h) = P(H = h) = \begin{cases} \dfrac{\binom{n_{1j}}{h}\binom{n_{2j}}{a_j - h}}{\binom{n_j}{a_j}}, & \max(0, a_j - n_{2j}) \le h \le \min(a_j, n_{1j}) \\ 0 & \text{otherwise} \end{cases},$$

and the cumulative hypergeometric distribution is

$$CHG(x) = P(H \le x) = \begin{cases} 0 & x < \max(0, a_j - n_{2j}) \\ \sum_{h=\max(0,a_j-n_{1j})}^{x} HG(h), & \max(0, a_j - n_{2j}) \le x \le \min(a_j, n_{1j}) \\ 1 & x > \min(a_j, n_{1j}) \end{cases}.$$

For Rate Measures, the notation needed is defined as

b_{1j} = the number of ILEC base elements in cell j

b_{2j} = the number of CLEC base elements in cell j

b_j = the total number of base elements in cell j; $b_{1j} + b_{2j}$

$\hat{f}_{1j}$ = the ILEC sample rate of cell j; n_{1j}/b_{1j}

$\hat{f}_{2j}$ = the CLEC sample rate of cell j; n_{2j}/b_{2j}

q_j = the relative proportion of ILEC elements for cell j; b_{1j}/b_j

The exact distribution for a parity test is the binomial distribution. The binomial probability mass function distribution for cell j is

$$BN(k) = P(B = k) = \begin{cases} \binom{n_j}{k} q_j^k (1-q_j)^{n_j-k}, & 0 \le k \le n_j \\ 0 & \text{otherwise} \end{cases},$$

and the cumulative binomial distribution is

$$CBN(x) = P(B \le x) = \begin{cases} 0 & x < 0 \\ \sum_{k=0}^{x} BN(k), & 0 \le x \le n_j \\ 1 & x > n_j \end{cases}.$$

For Ratio Performance Measures the following additional notation is needed.

U_{1jk} = additional quantity of interest of an individual ILEC transaction in cell j; k = 1,..., n_{1j}

U_{2jk} = additional quantity of interest of an individual CLEC transaction in cell j; k = 1,..., n_{2j}

$\hat{R}_{ij}$ = the ILEC (i = 1) or CLEC (i = 2) ratio of the total additional quantity of interest to the base transaction total in cell j, i.e., $\sum_k U_{ijk} \Big/ \sum_k X_{ijk}$

Calculating the Truncated Z

The general methodology for calculating an aggregate level test statistic is outlined below.

1. **Calculate cell weights, W_j.** A weight based on the number of transactions is used so that a cell which has a larger number of transactions has a larger weight. The actual weight formulae will depend on the type of measure.

Mean or Ratio Measure

$$W_j = \sqrt{\frac{n_{1j} n_{2j}}{n_j}}$$

Proportion Measure

$$W_j = \sqrt{\frac{n_{2j} n_{1j}}{n_j} \cdot \frac{a_j}{n_j} \cdot \left(1 - \frac{a_j}{n_j}\right)}$$

Rate Measure

$$W_j = \sqrt{\frac{b_{1j} b_{2j}}{b_j} \cdot \frac{n_j}{b_j}}$$

2. **In each cell, calculate a Z value**, Z_j. A Z statistic with mean 0 and variance 1 is needed for each cell.

   - If $W_j = 0$, set $Z_j = 0$.
   - Otherwise, the actual Z statistic calculation depends on the type of performance measure.

Mean Measure

$$Z_j = \Phi^{-1}(\alpha)$$

where α is determine by the following algorithm.

If $\min(n_{1j}, n_{2j}) > 6$, then determine α as

$$\alpha = P(t_{n_{1j}-1} \le T_j),$$

that is, α is the probability that a t random variable with n_{1j} - 1 degrees of freedom, is less than

$$T_j = \begin{cases} t_j + \frac{g}{6}\left(\frac{n_{1j} + 2n_{2j}}{\sqrt{n_{1j}\, n_{2j}(n_{1j} + n_{2j})}}\right)\left(t_j^2 + \frac{n_{2j} - n_{1j}}{n_{1j} + 2n_{2j}}\right) & t_j \ge t_{\min j} \\ t_j + \frac{g}{6}\left(\frac{n_{1j} + 2n_{2j}}{\sqrt{n_{1j}\, n_{2j}(n_{1j} + n_{2j})}}\right)\left(t_{\min j}^2 + \frac{n_{2j} - n_{1j}}{n_{1j} + 2n_{2j}}\right) & \text{otherwise} \end{cases}$$

where

$$t_j = \frac{\bar{X}_{1j} - \bar{X}_{2j}}{s_{1j}\sqrt{\frac{1}{n_{1j}} + \frac{1}{n_{2j}}}},$$

$$t_{\min j} = \frac{-3\sqrt{n_{1j} n_{2j} n_j}}{g(n_{1j} + 2n_{2j})}$$

and g is the median value of all values of

$$\gamma_{1j} = \frac{n_{1j}}{(n_{1j} - 1)(n_{1j} - 2)} \sum_k \left(\frac{X_{1jk} - \bar{X}_{1j}}{s_{1j}}\right)^3$$

with $n_{1j} > n_{3q}$ for all values of j. n_{3q} is the 3 quartile of all values of n_{1j}

Note, that t_j is the "modified Z" statistic. The statistic T_j is a "modified Z" corrected for the skewness of the ILEC data.

If $\min(n_{1j}, n_{2j}) \le 6$, and

a) $M_j \le 1{,}000$ (the total number of distinct pairs of samples of size n_{1j} and n_{2j} is 1,000 or less).

- Calculate the sample sum for all possible samples of size n_{2j}.
- Rank the sample sums from smallest to largest. Ties are dealt by using average ranks.
- Let R_0 be the rank of the observed sample sum with respect all the sample sums.

$$\alpha = 1 - \frac{R_0 - 0.5}{M_j}$$

b) $M_j > 1{,}000$

- Draw a random sample of 1,000 sample sums from the permutation distribution.
- Add the observed sample sum to the list. There is a total of 1001 sample sums. Rank the sample sums from smallest to largest. Ties are dealt by using average ranks.
- Let R_0 be the rank of the observed sample sum with respect all the sample sums.

$$\alpha = 1 - \frac{R_0 - 0.5}{1001}.$$

Proportion Measure

$$Z_j = \frac{n_j\, a_{1j} - n_{1j}\, a_j}{\sqrt{\dfrac{n_{1j}\, n_{2j}\, a_j\, (n_j - a_j)}{n_j - 1}}}.$$

Rate Measure

$$Z_j = \frac{n_{1j} - n_j\, q_j}{\sqrt{n_j\, q_j (1 - q_j)}}$$

Ratio Measure

$$Z_j = \frac{\hat{R}_{1j} - \hat{R}_{2j}}{\sqrt{V(\hat{R}_{1j})\left(\dfrac{1}{n_{1j}} + \dfrac{1}{n_{2j}}\right)}}$$

$$V(\hat{R}_{1j}) = \frac{\sum_k \left(U_{1jk} - \hat{R}_{1j} X_{1jk}\right)^2}{\bar{X}_{1j}^2 (n_{1j} - 1)} = \frac{\sum_k U_{1jk}^2 - 2\hat{R}_{1j} \sum_k \left(U_{1jk} X_{1jk}\right) + \hat{R}_{1j}^2 \sum_k X_{1jk}^2}{\bar{X}_{1j}^2 (n_{1j} - 1)}$$

3. **Obtain a truncated Z value for each cell, Z_j^*.** To limit the amount of cancellation that takes place between cell results during aggregation, cells whose results suggest possible favoritism are left alone. Otherwise the cell statistic is set to zero. This means that positive equivalent Z values are set to 0, and negative values are left alone. Mathematically, this is written as

$$Z_j^* = \min(0, Z_j).$$

4. **Calculate the theoretical mean and variance of the truncated statistic under the null hypothesis of parity,** $E(Z_j^* | H_0)$ and $Var(Z_j^* | H_0)$. In order to compensate for the truncation in step 3, an aggregated, weighted sum of the Z_j^* will need to be centered and scaled properly so that the final aggregate statistic follows a standard normal distribution.

   - If $W_j = 0$, then no evidence of favoritism is contained in the cell. The formulae for calculating $E(Z_j^* | H_0)$ and $Var(Z_j^* | H_0)$ cannot be used. Set both equal to 0.

   - If $\min(n_{1j}, n_{2j}) > 6$ for a mean measure, $\min\left\{a_{1j}\left(1-\frac{a_{1j}}{n_{1j}}\right), a_{2j}\left(1-\frac{a_{2j}}{n_{2j}}\right)\right\} > 9$ for a proportion measure, $\min\left(n_{1j}, n_{2j}\right) > 15$ and $n_j q_j (1-q_j) > 9$ for a rate measure, or n_{1j} and n_{2j} are large for a ratio measure then

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

$$Var(Z_j^* | H_0) = \frac{1}{2} - \frac{1}{2\pi}.$$

   - Otherwise, determine the total number of values for Z_j^*. Let z_{ji} and θ_{ji}, denote the values of Z_j^* and the probabilities of observing each value, respectively.

$$E(Z_j^* | H_0) = \sum_i \theta_{ji} z_{ji}, \text{and}$$

$$Var(Z_j^* | H_0) = \sum_i \theta_{ji} z_{ji}^2 - \left[E(Z_j^* | H_0)\right]^2.$$

The actual values of the z's and θ's depends on the type of measure.

Mean Measure

$$N_j = \min(M_j, 1{,}000), \; i = 1, \ldots, N_j$$

$$z_{ji} = \min\left\{0, \Phi^{-1}\left(1 - \frac{R_i - 0.5}{N_j}\right)\right\} \quad \text{where } R_i \text{ is the rank of sample sum i}$$

$$\theta_j = \frac{1}{N_j}$$

Proportion Measure

$$z_{ji} = \min\left\{0, \frac{n_j\, i - n_{1j}\, a_j}{\sqrt{\frac{n_{1j}\, n_{2j}\, a_j\, (n_j - a_j)}{n_j - 1}}}\right\}, \quad i = \max(0, a_j - n_{2j}), \ldots, \min(a_j, n_{1j})$$

$$\theta_{ji} = HG(i)$$

Rate Measure

$$z_{ji} = \min\left\{0, \frac{i - n_j\, q_j}{\sqrt{n_j\, q_j (1 - q_j)}}\right\}, \quad i = 0, \ldots, n_j$$

$$\theta_{ji} = BN(i)$$

Ratio Measure

The performance measure that is in this class is billing accuracy. If a parity test were used, the sample sizes for this measure are quite large, so there is no need for a small sample technique. If one does need a small sample technique, then a resampling method can be used.

1. **Calculate the aggregate test statistic, Z^T.**

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

The Balancing Critical Value

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[2] 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:

[2] This decision rule assumes that a negative test statistic indicates poor service for the CLEC customer. If the opposite is true, then reverse the decision rule.

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

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

We want a balancing critical value, c_B, so that $\alpha = \beta$.

It can be shown that.

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

where

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

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

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

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 calculate weights section above) for a cell with small volume, the cell mean and variance will not contribute much to the weighted sum. Therefore, the above formula provides a reasonable approximation to the balancing critical value.

The values of m_j and se_j will depend on the type of performance measure.

Mean Measure

For mean measures, one is concerned with two parameters in each cell, namely, the mean and variance. A possible lack of parity may be due to a difference in cell means, and/or a difference in cell variances. One possible set of hypotheses that capture this notion, and 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 form of alternative hypothesis, the cell test statistic Z_j has mean and standard error given by

$$m_j = \frac{-\delta_j}{\sqrt{\frac{1}{n_{1j}} + \frac{1}{n_{2j}}}}, \text{ and}$$

$$se_j = \sqrt{\frac{\lambda_j n_{1j} + n_{2j}}{n_{1j} + n_{2j}}}$$

Proportion Measure

For a proportion measure there is only one parameter of interest in each cell, the proportion of transaction possessing an attribute of interest. A possible lack of parity may be due to a difference in cell proportions. A set of hypotheses that take into account the assumption that transaction are identically distributed within cells while allowing for an analytically tractable solution is:

$$H_0: \frac{p_{2j}(1-p_{1j})}{(1-p_{2j})p_{1j}} = 1$$

$$H_a: \frac{p_{2j}(1-p_{1j})}{(1-p_{2j})p_{1j}} = \psi_j \qquad \psi_j > 1 \text{ and } j = 1,\ldots,L.$$

These hypotheses are based on the "odds ratio." If the transaction attribute of interest is a missed trouble repair, then an interpretation of the alternative hypothesis is that a CLEC trouble repair appointment is ψ_j times more likely to be missed than an ILEC trouble.

Under this form of alternative hypothesis, the within cell asymptotic mean and variance of a_{1j} are given by[3]

$$E(a_{1j}) = n_j \pi_j^{(1)}$$

$$\text{var}(a_{1j}) = \frac{n_j}{\frac{1}{\pi_j^{(1)}} + \frac{1}{\pi_j^{(2)}} + \frac{1}{\pi_j^{(3)}} + \frac{1}{\pi_j^{(4)}}}$$

where

$$\pi_j^{(1)} = f_j^{(1)}\left(n_j^2 + f_j^{(2)} + f_j^{(3)} - f_j^{(4)}\right)$$

$$\pi_j^{(2)} = f_j^{(1)}\left(-n_j^2 - f_j^{(2)} + f_j^{(3)} + f_j^{(4)}\right)$$

$$\pi_j^{(3)} = f_j^{(1)}\left(-n_j^2 + f_j^{(2)} - f_j^{(3)} + f_j^{(4)}\right)$$

$$\pi_j^{(4)} = f_j^{(1)}\left(n_j^2\left(\frac{2}{\psi_j} - 1\right) - f_j^{(2)} - f_j^{(3)} - f_j^{(4)}\right)$$

$$f_j^{(1)} = \frac{1}{2n_j^2\left(\frac{1}{\psi_j} - 1\right)}$$

$$f_j^{(2)} = n_j n_{1j}\left(\frac{1}{\psi_j} - 1\right)$$

$$f_j^{(3)} = n_j a_j\left(\frac{1}{\psi_j} - 1\right)$$

$$f_j^{(4)} = \sqrt{n_j^2\left[4n_{1j}\left(n_j - a_j\right)\left(\frac{1}{\psi_j} - 1\right) + \left(n_j + \left(a_j - n_{1j}\right)\left(\frac{1}{\psi_j} - 1\right)\right)^2\right]}$$

Recall that the cell test statistic is given by

$$Z_j = \frac{n_j a_{1j} - n_{1j} a_j}{\sqrt{\frac{n_{1j} n_{2j} a_j (n_j - a_j)}{n_j - 1}}}.$$

[3] Stevens, W. L. (1951) Mean and Variance of an entry in a Contingency Table. *Biometrica*, **38**, 468-470.

Using the equations above, we see that Z_j has mean and standard error given by

$$m_j = \frac{n_j^2 \pi_j^{(1)} - n_{1j}\, a_j}{\sqrt{\frac{n_{1j}\, n_{2j}\, a_j\, (n_j - a_j)}{n_j - 1}}}, \text{ and}$$

$$se_j = \sqrt{\frac{n_j^3 (n_j - 1)}{n_{1j}\, n_{2j}\, a_j\, (n_j - a_j)\left(\frac{1}{\pi_j^{(1)}} + \frac{1}{\pi_j^{(2)}} + \frac{1}{\pi_j^{(3)}} + \frac{1}{\pi_j^{(4)}}\right)}}.$$

Rate Measure

A rate measure also has only one parameter of interest in each cell, the rate at which a phenomenon is observed relative to a base unit, e.g. the number of troubles per available line. A possible lack of parity may be due to a difference in cell rates. A set of hypotheses that take into account the assumption that transaction are identically distributed within cells is:

H_0: $r_{1j} = r_{2j}$

H_a: $r_{2j} = \varepsilon_j r_{1j}$ $\qquad \varepsilon_j > 1$ and $j = 1,\ldots,L$.

Given the total number of ILEC and CLEC transactions in a cell, n_j, and the number of base elements, b_{1j} and b_{2j}, the number of ILEC transaction, n_{1j}, has a binomial distribution from n_j trials and a probability of

$$q_j^* = \frac{r_{1j} b_{1j}}{r_{1j} b_{1j} + r_{2j} b_{2j}}.$$

Therefore, the mean and variance of n_{1j}, are given by

$$E(n_{1j}) = n_j q_j^*$$
$$\text{var}(n_{1j}) = n_j q_j^* (1 - q_j^*)$$

Under the null hypothesis

$$q_j^* = q_j = \frac{b_{1j}}{b_j},$$

but under the alternative hypothesis

$$q_j^* = q_j^* = \frac{b_{1j}}{b_{1j} + \varepsilon_j b_{2j}}.$$

Recall that the cell test statistic is given by

$$Z_j = \frac{n_{1j} - n_j\, q_j}{\sqrt{n_j\, q_j (1 - q_j)}}.$$

Using the relationships above, we see that Z_j has mean and standard error given by

$$m_j = \frac{n_j\left(q_j^a - q_j\right)}{\sqrt{n_j q_j (1-q_j)}} = (1-\varepsilon_j)\frac{\sqrt{n_j b_{1j} b_{2j}}}{b_{1j} + \varepsilon_j b_{2j}}, \text{ and}$$

$$se_j = \sqrt{\frac{q_j^a(1-q_j^a)}{q_j(1-q_j)}} = \sqrt{\varepsilon_j}\,\frac{b_j}{b_{1j} + \varepsilon_j b_{2j}}.$$

Ratio Measure

As with mean measures, one is concerned with two parameters in each cell, the mean and variance, when testing for parity of ratio measures. As long as sample sizes are large, as in the case of billing accuracy, the same method for finding m_j and se_j that is used for mean measures can be used for ratio measures.

Determining the Parameters of the Alternative Hypothesis

In this appendix we have indexed the alternative hypothesis of mean measures by two sets of parameters, λ_j and δ_j. Proportion and rate measures have been indexed by one set of parameters each, ψ_j and ε_j respectively. A major difficulty with this approach is that more than one alternative will be of interest; for example we may consider one alternative in which all the δ_j are set to a common non-zero value, and another set of alternatives in each of which just one δ_j is non-zero, while all the rest are zero. There are very many other possibilities. Each possibility leads to a single value for the balancing critical value; and each possible critical value corresponds to many sets of alternative hypotheses, for each of which it constitutes the correct balancing value.

The formulas we have presented can be used to evaluate the impact of different choices of the overall critical value. For each putative choice, we can evaluate the set of alternatives for which this is the correct balancing value. 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 Choices for λ_j. 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. At the state level we are aggregating over CLECs, so using the same δ as for an individual CLEC would be saying that a "meaningful" degree of disparity is one where the violation is the same (δ) for each CLEC. But the detection of disparity for any component CLEC is important, so the relevant "overall" δ should be smaller.

- Parameter Choices for ψ_j or ε_j. The set of parameters ψ_j or ε_j are also important in the choice of the balancing point for tests of their respective measures. The reason for this is that they directly index increases in the proportion or rate of service performance. The truncated Z test is sensitive to such increases; but not as sensitive as the case of δ for mean measures. Sample size matters here too. As with mean measures, using the same value of ψ or ε for the overall state testing does not seem sensible.

The three parameters are related however. If a decision is made on the value of δ, it is possible to determine equivalent values of ψ and ε. The following equations, in conjunction with the definitions of ψ and ε, show the relationship with delta.

$$\delta = 2 \cdot \arcsin(\sqrt{\hat{p}_2}) - 2 \cdot \arcsin(\sqrt{\hat{p}_1})$$

$$\delta = 2\sqrt{\hat{r}_2} - 2\sqrt{\hat{r}_1}$$

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.

Decision Process

Once Z^T has been calculated, it is compared to the balancing critical value to determine if the ILEC is favoring its own customers over a CLEC's customers.

This critical value changes as the ILEC and CLEC transaction volume change. One way to make this transparent to the decision maker, is to report the difference between the test statistic and the critical value, *diff* = Z^T - c_B. If favoritism is concluded when $Z^T < c_B$, then the *diff* < 0 indicates favoritism.

This make it very easy to determine favoritism: a positive *diff* suggests no favoritism, and a negative *diff* suggests favoritism.