ORIGINAL

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In Re: Consideration of BellSouth Telecommunications, Inc.'s entry into interLATA services pursuant to Section 271 of the Federal Telecommunications Act of 1996	)	Docket No. 960786-TL Filed: 11/19/99

AT&T'S COMMENTS ON BELLSOUTH'S PROPOSED SERVICE QUALITY MEASURES

AT&T Communications of the Southern States, Inc. ("AT&T"), hereby files its comments on and suggested modifications to the Service Quality Measures ("SQMs") proposed by BellSouth.

AT&T commends Staff on its decision to investigate appropriate interim SQMs to be used for third party OSS testing. Appropriate SQMs are essential to the Commission's review of BellSouth's performance, both on an interim basis for testing purposes, and on a permanent basis, to determine performance in the competitive marketplace. AT&T welcomes the opportunity to provide input into formulation of interim SQMs.

Essential Concepts

AFA 4
APP
CAF
CMU 3
CTR
EAG
LEG 1
MAS 5
OPC
PAI
SEC 1
WAW
OTH

Staff should ensure that interim and permanent performance measures follow the "three C's" of performance metrics: completeness, continuity, and consistency of data tracking across the processes being measured. Not only should each metric provide a complete measure of the activity in question, but it should seamlessly link the activity and its data to any preceding and succeeding activities in the process. This will ensure

that the results and their relationships are consistent across the entirety of the support process.

For example, ALECs submit Local Service Requests ("LSR"), which then should be acknowledged as being received by BellSouth. Thereafter, the ALEC should receive either a rejection or a firm order confirmation ("FOC") for each LSR. If BellSouth's systems are performing correctly, the sum of rejects and FOCs will equal the number of LSRs submitted. If the sum of the rejects and FOCs do not equal the LSRs, the systems are not performing correctly, and the cause(s) of such errors must be specifically identified and counted. This same procedure must occur at every branch in the process being measured to ensure that the implemented measures capture the final disposition of all inputs to the process, without gaps or discontinuities in the measurement process.

This concept also encompasses measurement of the entire interval of time during which BellSouth has the responsibility for performing an activity and notifying the ALEC of the result of that activity. The activity is continuous from BellSouth's receipt of an ALEC transaction until BellSouth provides a response to the ALEC at its interfacing point with the ALEC. A measurement that stops with the creation of a response at some point prior to its transmittal to the ALEC is incomplete.

Priority of Revisions to BellSouth's SQMs

Staff requested parties to indicate the relative priority of suggested revisions to BellSouth's SQMs. Placing performance measures deficiencies in priority order requires some painfully difficult choices because many, if not all, of the deficiencies in BellSouth's current performance measures methodology allow BellSouth to mask

discriminatory performance. However, at a minimum, the following eight areas must be addressed by the Commission in order to obtain usable data from the third party test in at least some key areas currently providing major impediments to ALECs.

1. BellSouth's SQMs lack appropriate analogs or benchmarks for each performance measure. Without appropriate analogs or benchmarks, BellSouth's performance to CLECs cannot adequately be assessed. BellSouth's discrimination in the marketplace prevents ALECs from having a meaningful opportunity to compete. See Attachment C for AT&T's proposed analogs and benchmarks for selected measures.

2. BellSouth's SQMs lack crucial measurements that are needed for the third party test. None of the measures shown below are included in BellSouth's current SQM; all are essential to augment BellSouth's SQM for the test to capture data necessary to conduct a more robust evaluation of BellSouth's OSS.[1]. Attachment A addresses these measures in more detail:

- % service loss from early cuts;
- % service loss from late cuts;
- % of hot cuts not working when initially provisioned;
- % completions or attempts without notice or with less than 24 hours' notice;
- % service order accuracy;
- % order cancelled or "supped" (supplemented) at the request of BellSouth; and
- % and timeliness of EDI and TAG LSR acknowledgments.

[1] AT&T understands that the Commission will conduct a full evidentiary proceeding to determine the permanent measurement methodology necessary in Florida to evaluate whether BellSouth is providing non-discriminatory service to ALECs in the marketplace.

3. BellSouth's "Missed Appointments" measure includes no indication of the length of time by which an appointment was missed. This omission renders the measure virtually useless in determining BellSouth's performance on hot cuts.

4. BellSouth's calculation of flow-through is inappropriate because it holds BellSouth blameless for its decisions to process ALEC orders manually – even though those orders were submitted electronically. This is a critical market entry issue, recognized by the FCC in its Louisiana II decision,[2] in which the FCC noted:

> Evidence of flow-through also serves as a clear and effective indicator of other significant problems that underlie a determination of whether a BOC is providing nondiscriminatory access to its operations support systems.

5. Some of BellSouth's measures utilize inappropriate formulas. This deficiency allows BellSouth to hide the actual amount of time it takes for BellSouth to conduct critical transactions. This problem is especially true in the calculation of Rejections, Firm Order Confirmations, Order Completion Intervals, and Completion Notices.

6. Some of BellSouth's measures inappropriately exclude critical information required to make the calculation of a measure meaningful and reflective of the ALECs' actual experience. Particularly critical exclusions include BellSouth's decisions to track some manual information, such as FOCs and rejections, but not others which are equally important, such as completion notices and jeopardies. The treatment of LNP orders

[2] Memorandum Opinion and Order, Application by BellSouth Corp., et al. for Provision of In-Region, InterLATA Services in Louisiana, 13 FCC Rcd 20599, para. 109, (1998).

within BellSouth's measurement system also must be closely examined, as must measures that inappropriately exclude such items as cancelled orders.

7. BellSouth's methodology utilizes an inappropriate level of disaggregation. This deficiency hides discrimination in the provision of a particular product, or in a certain geography, or in the volumes in which products are being ordered.

8. Some of BellSouth's billing metrics titled in a misleading manner, in that they simply do not measure what the title leads one to believe. Additionally, these billing metrics provide essentially useless information, rather than the critical measurements needed to assess BellSouth's performance. For example,

- The invoice accuracy measure does not measure invoice accuracy, but instead measures revenue adjustments, all of which are 100% controlled by BellSouth.

- The usage accuracy measure does not measure the accuracy of the usage. It measures only whether the data packs arrived at their destination.

- The usage timeliness measure does not provide average performance. Instead, BellSouth's benchmark for this measure is a comfortable benchmark for BellSouth that prevents true comparisons between BellSouth's performance for its customers and the performance it provides to ALECs.

AT&T's Suggested Revsions

AT&T's suggested revisions to BellSouth's proposed SQMs are attached hereto and incorporated herein as follows:

Attachment A: Seven Additional Interim Measures for Purpose of Third Party Testing;

Attachment B: Key Deficiencies in BellSouth's 09/15/99 Proposed SQMs;

Attachment C: Selected Product Disaggregation, Benchmarks and Retail Analogs; and

Attachment D: Appropriate Statistical Methodology

Conclusion

Carefully-designed measures should reveal discriminatory performance that would be masked by inadequate measures. Discriminatory performance to ALECs will result in poor service to Florida consumers. AT&T urges Staff to keep Florida consumers in mind when selecting and defining interim measures for third party testing, to ensure that consumers receive the benefit of a test that reveals, rather than masks, discriminatory performance by BellSouth.

RESPECTFULLY SUBMITTED this 19th day of November, 1999.

Marsha E. Rule by kf

Marsha E. Rule
101 N. Monroe St.
Suite 700
Tallahassee, FL 32301
(850)425-6365

ATTORNEY FOR AT&T COMMUNICATIONS OF THE SOUTHERN STATES, INC.

CERTIFICATE OF SERVICE
DOCKETS 981834-TP and 990321-TP

I HEREBY CERTIFY that a true and correct copy of the foregoing was furnished via U.S. Mail to the following parties of record on this 19th day of November, 1999:

Robert Vandiver
FPSC
2540 Shumard Oak Blvd.
Room 390M
Tallahassee, FL 32399-0850

Martha Carter Brown
FPSC
2540 Shumard Oak Blvd.
Room 390M
Tallahassee, FL 32399-0850

Nancy B. White
c/o Nancy Sims
BellSouth Telecommunications, Inc.
150 S. Monroe, Suite 400
Tallahassee, FL 32301

Joseph A. McGlothlin
Vicki Gordon Kaufman
McWhirter, Reeves, McGlothlin,
Davidson, Rief & Bakas, P.A.
117 S. Gadsden St.
Tallahassee, FL 32301

Andrew O. Isar
Telecommunications Resellers Assoc.
4312 92nd Ave, NW
Gig Harbor, WA 98335

Terry Monroe
CompTel
1900 M Street, NW
Suite 800
Washington, DC 20036

Patrick K. Wiggins
Charles Pellegrini
Wiggins & Villacorta, P.A.
2145 Delta Blvd., Ste. 200
Tallahassee, FL 32303

Richard Melson
Gabriel E. Nieto
Hopping Law Firm
P.O. Box 6526
Tallahassee, FL 32314

Floyd R. Self
Norman H. Horton
Messer, Caparello & Self
215 S. Monroe St., Ste. 701
Tallahassee, FL 32301-1873

Donna Canzano-McNulty
MCI WorldCom
325 John Knox Rd, Suite 105
Tallahassee, FL 32303

Carolyn Marek
Time Warner Communications
233 Bramerton Court
Franklin, TN 37069

Mark Buechele
Supra Telecommunications
2620 SW 27th Ave.
Miami, FL 33133

James C. Falvey
e.spire Communications, Inc.
133 National Business Pkwy.
Suite 200
Annapolis Junction, MD 20701

ACI Corp.
7337 S. Revere Pkwy.
Englewood, CO 80112

Elise Kiely/Jeffrey Blumenfeld
Blummenfeld & Cohen
1625 Massachusetts Ave, NW
Suite 300
Washington, DC 20036

Kimberly Caswell
GTE Florida Incorporated
P.O. Box 110, FLTC0007
Tampa, FL 33601-0110

Scott Sapperstein
Intermedia Communications Inc.
3625 Queen Palm Dr.
Tampa, FL 33619

Peter Dunbar/Barbara Auger
Pennington Law Firm
P.O. Box 10095
Tallahassee, FL 32301

Dulaney L. O'Roark
MCI Telecommunications Corp.
780 Johnson Ferry Rd
Suite 700
Atlanta, GA 30342

Susan Huther
MGC Communications, Inc.
3301 Worth Buffalo Dr.
Las Vegas, NV 89129

Charles J. Beck
Deputy Public Counsel
Office of the Public Counsel
111 West Madison Street, Room 812
Tallahassee, FL 32399-1400

Michael Gross
FCTA
310 N. Monroe St.
Tallahassee, FL 32301

Laura L. Gallagher, P.A.
101 E. College Ave.
Suite 302
Tallahassee, FL 32301

James P. Campbell
MediaOne
7800 Belfort Pkwy.
Suite 250
Jacksonville, FL 32256

Christopher V. Goodpastor
Covad Communications Company
9600 Great Hills Trl., Suite 150W
Austin, TX 78759

Susan S. Masterson
Charles J. Rehwinkel
Sprint Communications Company
P.O. Box 2214
MC: FLTLHO0107
Tallahassee, FL 32316

Bettye Willis
ALLTEL Communications
Services, Inc.
One Allied Drive
Little Rock, AR 72203-2177

J. Jeffry Wahlen
Ausley & McMullen
P.O. Box 391
Tallahassee, FL 32302

Attorney

Attachment A

Seven Additional Interim Measures for Purpose of Third Party Testing

Report/Measurement:

% Service Loss from Early Cuts

Definition:

For each conversion, the ILEC will track whether the cutover time (for facilities and translations) was earlier than the committed due date and time that appeared on the FOC or the LSR. The total number of early cutovers will be divided by the total number of customer conversions that were completed during the reporting period. The resulting ratio will be expressed as a percentage.

Exclusions:

- None

Business Rules:

For hot loop cuts, the same loop is moved from an existing port to what is effectively a different port (The ALEC collocation point). Translation disconnections are reported if they occur too early in a conversion involving local number portability. For each conversion, BST will track whether the cutover time (for facilities and translations) was earlier than the committed due date and time that appeared on the FOC or the LSR.

Calculation:

% Service Loss from Early Cuts = (Customer Conversion Where Cutover Time is Earlier Than Due Date and Time)/(All Customer Conversions Completed During Reporting Period)] x 100

Report Structure:

•

Level of Disaggregation:

- Company
- Type of Loop or UNE Combination Cutover and Type of NP involved (i.e. ILNP, PNP or ILNP-to-PNP conversion).
  - 2 Wire Analog and Digital and NP(1-10)
  - 2 Wire Analog and Digital and NP(11-20)
  - 2 Wire Analog and Digital and NP(20+)
  - DS1 loop(includes PRI) (1-10)
  - DS1 loop(includes PRI) (11-10)
  - DS1 loop(includes PRI) (20+)
  - XDSL loop(1-10)
  - XDSL loop(11-20)
  - XDSL loop(20+)
  - Extended Enhanced Loops
  - ILNP to PNP Conversions
- Order Activity
- Geography
- Volume Category

Data Retained Relating to ALEC Experience	**Data Retained Relating to BST Experience**
• Report Month • Service Type • Order Activity • Committed Due Date and Time (from Firm Order Confirmation) • Completion Date and Time • Geographic Scope • Volume Category	• Report Month • Number of Early Conversions • Total Number of Conversions • Average Conversion Interval • Standard Error of Conversion Interval • Geographic Scope • Volume Category

Retail Analog/Benchmark:

98% of unscheduled disruptions causing loss of dialtone or inbound call blocking should be corrected in 1 hour and 100% within 2 hours

Report/Measurement:

% Service Loss (Late Cuts)

Definition:

The total number of late cutovers will be divided by the total number of customer conversions that were completed during the reporting period. The total number of cutovers that were completed more than 30 minutes past the committed due date and time will be divided by the total number of customer conversions that were completed during the reporting period. The resulting ratio will be expressed as a percentage.

Exclusions:

- None

Business Rules:

For hot loop cuts, the same loop is moved from an existing port to what is effectively a different port (The ALEC collocation point). Translation disconnections also are reported if they occur too late in a conversion involving local number portability. For each conversion, BST will track whether the cutover time (for facilities and translations) was later than the committed due date and time that appeared on the FOC or the LSR.

Calculation:

% Service Loss from Late Cuts = (Customer Conversion Where Cutover Time is More Than 30 Minutes Past Due Date and Time)/(All Customer Conversions Completed During Reporting Period)] x 100

Report Structure:

•

Level of Disaggregation:

- Company
- Type of Loop or UNE Combination Cutover and Type of NP involved (i.e. ILNP, PNP or ILNP-to-PNP conversion).
  - 2 Wire Analog and Digital and NP(1-10)
  - 2 Wire Analog and Digital and NP(11-20)
  - 2 Wire Analog and Digital and NP(20+)
  - DS1 loop(includes PRI) (1-10)
  - DS1 loop(includes PRI) (11-10)
  - DS1 loop(includes PRI) (20+)
  - XDSL loop(1-10)
  - XDSL loop(11-20)
  - XDSL loop(20+)
  - Enhanced Extended Loop
- Order Activity
- Geography
- Volume Category

Data Retained Relating to ALEC Experience	Data Retained Relating to BST Experience
• Report Month • Service Type • Order Activity • Committed Due Date and Time (from Firm Order Confirmation) • Completion Date and Time • Geographic Scope • Volume Category	• Report Month • Number of Early Conversions • Number of Conversions > 30 Minutes Late • Total Number of Conversions • Average Conversion Interval • Standard Error of Conversion Interval • Geographic Scope • Volume Category

Retail Analog/Benchmark:

98% of unscheduled disruptions causing loss of dialtone or inbound call blocking should be corrected in 1 hour and 100% within 2 hours

Report/Measurement:
% of Hot Cuts Not Working When Initially Provisioned (Expressed as a Fraction)
Definition:
BST will track the number of Hot Cuts that are not working when initially provisioned by the number of provisioning trouble tickets opened by the ALEC during the porting process that are ultimately attributable to BST. The measurement will be calculated by dividing this trouble ticket number by the total number of Hot Cuts provisioned for the ALEC during the reporting period. This measurement will be expressed as a fraction.
Exclusions:
• None
Business Rules:
BST will track the number of Hot Cuts that are not working as initially provisioned by the number of provisioning trouble tickets opened by the ALEC during the porting process that are ultimately attributable to BST. The measurement will be calculated by dividing this trouble ticket number by the total number of Hot Cuts provisioned for the ALEC during the reporting period. This measurement will be expressed as a fraction. This measure does not include downtime associated with moving the cross-connect or activation to the NPAC.
Calculation:
% of Hot Cuts not working when initially Provisioned (Expressed as a Fraction) = (# of Trouble Reports ultimately attributable to the ILEC on initial customer cutover) / (# of Hot Cuts Provisioned during the reporting Period)[1]
Report Structure:
•
Level of Disaggregation:

• Company
• Type of Loop or UNE Combination Cutover and Type of NP involved (i.e. ILNP, PNP or ILNP-to-PNP conversion).
  • 2 Wire Analog and Digital and NP(1-10)
  • 2 Wire Analog and Digital and NP(11-20)
  • 2 Wire Analog and Digital and NP(20+)
  • DS1 loop(includes PRI) (1-10)
  • DS1 loop(includes PRI) (11-10)
  • DS1 loop(includes PRI) (20+)
  • XDSL loop(1-10)
  • XDSL loop(11-20)
  • XDSL loop(20+)
  • Enhanced Extended Loops
  • ILNP to PNP conversions
• Order Activity
• Geography
• Volume Category

Data Retained Relating to ALEC Experience	Data Retained Relating to BST Experience
• Report Month • Service Type • Order Activity • Committed Due Date and Time (from Firm Order Confirmation)	• Report Month • Provisioning Trouble Tickets • Total Number of Conversions • Average Conversion Interval • Standard Error of Conversion Interval

[1] The measure assumes the acceptance by the ILEC of AT&T Preferred Hot Cut Process. In particular, the measure relies on acceptance of a procedure that allows the ALEC to "open a trouble ticket with the ILEC provisioning group, rather than with the ILEC maintenance organization. As a result, the ILEC reports the number of trouble tickets that the ALEC opens on Hot Cuts which are ultimately found to be attributable to the ILEC. Trouble tickets will not be generated due to the downtime associated with the technician's retermination of the customer's loop as well with the sending of the "activation" to the NPAC.

• Completion Date and Time • Geographic Scope • Volume Category	• Geographic Scope • Volume Category
Retail Analog/Benchmark:	
< 1% of all Hot Cuts not working as initially provisioned	

Report/Measurement:

% Completions or Attempts without Notice or With Less Than 24 Hours Notice

Definition:

Completion and Completion Attempts include any delivery of service (successful or not successful) for which the ALEC did not receive sufficient prior notification.

Exclusions:

- Completions or attempts without notice or with less than 24-hours' notice delivery that the ALEC specifically requested

Business Rules:

BST reports completions for which BST technicians delivered service to customers without giving sufficient advance notice to the ALEC to ensure that the migration had been pre-tested, to arrange for appropriate vendors to be on hand and/or otherwise prepare for the migration of service. Calculation would exclude any successful or unsuccessful service delivery that ALEC was informed of at least 24 hours in advance.

Calculation:

% Completions or Attempts without Notice or with Less Than 24 Hours Notice = [Completion Dispatches (Successful and Unsuccessful) With No FOC or FOC Received Within 24 Hours of Due Date/All Completions] x 100

Report Structure:

-

Level of Disaggregation:

- Company
- Service Type
  - 2 Wire Analog and Digital and NP(1-10)
  - 2 Wire Analog and Digital and NP(11-20)
  - 2 Wire Analog and Digital and NP(20+)
  - DS1 loop(includes PRI) (1-10)
  - DS1 loop(includes PRI) (11-10)
  - DS1 loop(includes PRI) (20+)
  - XDSL loop(1-10)
  - XDSL loop(11-20)
  - XDSL loop(20+)
  - Switch Ports – Analog Port
  - Switch Ports – BRI Port(1-50)
  - Switch Ports – BRI Port(50+)
  - Switch Port – PRI Port(1-20)
  - Switch Port – PRI Port(20+)
  - DS1 Trunk Port (1 to 10)
  - DS1 Trunk Port (11 to 20)
  - DS1 Trunk Port (20+)
  - Dedicated Transport (DS0, DS1, and DS3) (1 to 10)
  - Dedicated Transport (DS0, DS1, and DS3) (11 – 20)
  - Dedicated Transport (DS), DS1 and DS3) (20+)
  - ILNP to PNP Conversions
- Order Activity
- Volume Category
- Geography

Data Retained Relating to ALEC Experience	Data Retained Relating to BST Experience
• Report Month • Service Type • ALEC Order Number • Order Submission Date • Order Submission Time • Status Type	• Report Month • Service Type • Status Type • Average Status Interval • Standard Error of Status Interval • Number of Orders Reflected In Result

• Status Notice Date • Status Notice Time • Standard Order Activity • Order Due Date	• Standard Order Activity • Number of Statuses Provided
Retail Analog/Benchmark:	
99% of completion and completion attempts should receive more than 24 hours notice	

Report/Measurement:

% Order Accuracy

Definition:

This measurement monitors the accuracy of the provisioning work performed by BST. For each order completed during the reporting period, the original account profile and the order that the ALEC sent to BST are compared to the services and features reflected upon the account profile as it existed following completion of the order by BST.

Exclusions:

- Orders cancelled by the ALEC
- Order Activities of BST associated with internal or administrative use of local services.

Business Rules:

An order is "completed without error" if all service attribute and account detail changes (as determined by comparing the original and the post order completion account profile) completely and accurately reflect the activity specified on the original and any supplemental ALEC orders. "Total number of orders completed" refers to the total number of order completion notices sent to the ALEC by BST for each reporting dimension.

Calculation:

% Order Accuracy = (Σ Orders Completed w/o Error) / Σ Orders Completed) x 100

Report Structure:

•

Level of Disaggregation:

- Resale Business
- Resale Residence
- Resale Specials
- UNE P
- UNE L with NP
- UNE L without NP
- Standalone LNP
- Other UNEs
- Trunks
- Switching
- Transport

Data Retained Relating to ALEC Experience	Data Retained Relating to BST Experience
• Report Month • Count of Orders Completed Without Manual Intervention • Count of Firm Order Confirmations • Count of Syntax Rejects • Count of Legacy System Rejects • Count of Orders Submitted • Interface Type • Order Activity Type • Original order date for rejected orders • Rejection Notice Date and Time • Service Type • Volume Category • Manual Fallout (for Mechanized Orders Only)	• Report Month • Count of Orders Completed Without Manual Intervention • Count of Order Confirmations • Count of Syntax Rejects • Count of Legacy System Reject • Count of Orders Submitted • Interface Type • Order Activity • Service Type • Volume Category

Retail Analog/Benchmark:

Completed ALEC orders, by reporting dimension, are accurate no less than 99% of the time

Report/Measurement:

% of Orders Cancelled or Supped at the Request of the BST (Expressed as a Fraction)

Definition:

Prior to or during the cutover, BST may encounter internal problems with its network which make it impossible to perform the cutover at the agreed upon time. This results in significant inconvenience to the customer. As a result, the percent of orders that are supped or cancelled due to jeopardies and network problems attributable to BST are measured. The resulting ratio will be expressed as a fraction.

Exclusions:

- None

Business Rules:

BST will track the number of orders that they request to be supped or changed. The total number of sups and cancels from the ALEC will also be tracked. The ratio will be calculated by dividing the number of orders supped or cancelled at the request of BST by the total sups or cancels during the reporting period.

Calculation:

% of Orders Cancelled or Supped at the Request of BST = (# of Orders Canelled or Supped at the Request of BST During the Reporting Period) / (# of cancels and sups during the reporting period)

Report Structure:

-

Level of Disaggregation:

- Company
- Type of Loop or UNE Combination Cutover and Type of NP involved (i.e. ILNP, PNP or ILNP-to-PNP conversion).
  - 2 Wire Analog and Digital and NP(1-10)
  - 2 Wire Analog and Digital and NP(11-20)
  - 2 Wire Analog and Digital and NP(20+)
  - DS1 loop(includes PRI) (1-10)
  - DS1 loop(includes PRI) (11-10)
  - DS1 loop(includes PRI) (20+)
  - XDSL loop(1-10)
  - XDSL loop(11-20)
  - XDSL loop(20+)
  - Enhanced Extended Loops
- Order Activity
- Geography
- Volume Category

Data Retained Relating to ALEC Experience	Data Retained Relating to BST Experience
• Report Month • Service Type • Order Activity • Committed Due Date and Time(from Firm Order Confirmation) • Completion Date and Time • Geographic Scope • Volume Category	• Report Month • Number of Early Conversions • Total Number of Conversions • Average Conversion Interval • Standard Error of Conversion Interval • Geographic Scope • Volume Category

Retail Analog/Benchmark:

< 1% of orders supped or cancelled at BST's request

Report/Measurement:	
% and Timeliness of EDI and TAG LSR Acknowledgements	
Definition:	
ALECs submitting Local Service Requests (LSRs) to BellSouth using the EDI interfaces should receive an acknowledgement (ACK) from the BellSouth EDI gateway known as a 997 Transaction Set. LSRs submitted using the TAG interface should be similarly acknowledged. Until these acknowledgements are received, ALECs do not know whether BellSouth has received their orders for processing. If these acknowledgements are not received in a timely manner the ALECs must contact BellSouth to determine the status of their orders and protect the service intervals requested by their customers. For the Florida Third Party Test, the tester tracks and records the number of LSRs sent, the number of ACKs received, the % of LSRs acknowledged, and the average ACK interval.	
Exclusions:	
• None	
Business Rules:	
The tester will track and record the number of ALEC EDI and TAG LSRs sent, the date time stamp of the transmittal, the number of BellSouth ACKs received by the tester, the date time stamp of the receipt, the % of LSRs acknowledged by BellSouth, and the average ACK interval.	
Calculation:	
% of LSRs Receiving ACK from BellSouth = (Number of ALEC LSRs sent) / (Number of BST ACKs received by tester) x 100 Average ACK Interval = Σ (Date Time Stamp of ACKs – Date Time Stamp of LSRs for ACKs received) / Number of ACKs received by tester	
Report Structure:	
•	
Level of Disaggregation:	
• Company • EDI • TAG	
Data Retained Relating to ALEC Experience	**Data Retained Relating to BST Experience**
• Report Month • EDI LSR counts and time stamps • EDI ACK counts and time stamps • TAG LSR counts and time stamps • TAG ACK counts and time stamps	• [2]
Retail Analog/Benchmark:	
100% LSRs Acknowledged within 15 minutes.	

[2] This metric is designed to be tracked by the tester only.

Attachment B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	BellSouth's Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
PRE-ORDERING AND ORDERING					
Average OSS Response Interval	Sum [(Date & Time of Legacy Response)-(Date & Time of Request to Legacy)]/(Number of Legacy Requests During the Reporting Period)	Calculation does not include all the time from when BellSouth received the query until it delivered the response back to the CLEC. Calculation should be modified to include time from when BST received the query until it delivered the response back to the CLEC.			BST does not currently report analogous information. BST has previously reported that it only samples its RNS results. BST should be required to provide RNS data as a retail analog. If business data not available, use LCUG benchmark which is as follows: 98% received in 2 seconds or less
OSS Interface Availability	(Functional Availability)/ (Scheduled Availability) X 100		BellSouth does not provide its own hours of scheduled availability needed in order to determine if parity exists. BST needs to report the actual available hours and scheduled hours for themselves as well as for the CLECs.		BST needs to include all the interfaces and databases required to provide functional availability in order to make a parity determination.
Percentage Flow-through Service Requests	Sum(Total Number of valid Service Requests that flow-through to the BST SOCs)/(Total Number of valid Service Requests delivered to BST SOCs) X 100	The calculation reflects BST's decision to exclude orders which BST has designed to fallout for manual processing. This is not compliant with the FCC. The business rule and formula should be modified to reflect that a valid LSR is an error-free LSR as described in BST's measure for percent rejected service request. The calculation should be modified to indicate that it includes service orders that are accepted by SOCs. The description should be clarified to indicate that it includes the LNP gateway.	The performance reports do not match the level of disaggregation in the 9/15 SQM. Disaggregation should be modified to reflect the following: - Resale Business - Resale Residences - Resale Specials - UNE P - UNE L with NP - UNE L without NP - Standalone LNP - Other UNEs - Trunks - Switching - Transport	Inappropriately excludes manual fallout and supplements to cancel LSRs. Error allocation not validated. BST should not be allowed to exclude manual fallout.	BST does not provide comparative data for business & residence retail services. BST should be able to provide data for business & residence retail services. AT&T does not agree that with BST use of a benchmark as opposed to an analog for this measure. If BST is unwilling to provide analogous data for comparative purpose, then AT&T recommends the LCUG benchmark of 98% flowthrough.

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	BellSouth's Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
Percent Rejected Service Requests	Sum(Total Number of Rejected Service Requests)/(Total Number of Service Requests Received) X 100	SOCs is not listed as one of the ordering sytems that can reject an order. EDI, TAG, LEO & LESOG are included. BST should be required to add SOCs as one of the ordering systems that can reject an order. BST should be required to appropriately calculate this formula in regional or aggregate reports. Unclear whether all versions of LSRs are included in the counts. BST should be required to include fatal rejections in the state and CLEC specific reports. What does LNP under development in business rule section mean?	Disaggregation should be modified to reflect the following: - Resale Business - Resale Residences - Resale Specials - UNE P - UNE L with NP - UNE L without NP - Standalone LNP - Other UNEs - Trunks - Switching - Transport		No retail analog provided.

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	BellSouth's Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
Reject Interval	Sum[(Date and Time of Service Requests Rejection)-(Date and Time of Service Request Receipt)]/(Number of Service Requests Rejected in Reporting Period)	SOCs is not listed as one of the ordering sytems that can reject an order. EDI, TAG, LEO & LESOG are included. BST should be required to add SOCs as one of the ordering systems that can reject an order. BST should be required to appropriately calculate this formula in regional or aggregate reports. Unclear whether all versions of LSRs are included in the counts. BST should be required to include fatal rejections in the state and CLEC specific reports. What does LNP under development in business rule section mean? For fully & partially mechanized rejections, the stop time should be the date and time stamp of the outgoing EDI/TAG message going to the CLEC. For non-mechanized, the stop time should the outgoing date & time stamp of the fax, assuming fax server issue between BST and AT&T is resolved.	Disaggregation should be modified to reflect the following: - Resale Business - Resale Residences - Resale Specials - UNE P - UNE L with NP - UNE L without NP - Standalone LNP - Other UNEs - Trunks - Switching - Transport	How is after hours time treated for manual or partially mechanized rejections?	No retail analog provided. If retail analog is not provided, the following benchmarks are recommended: Mechanized – 1 hour Partially Mechanized – 5 hours Manual – 24 hours

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	BellSouth's Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
Firm Order Confirmation Timeliness	Sum[(Date and Time of Firm Order Confirmation)-(Date and Time of Service Request Receipt)]/(Number of Service Requests Confirmed in Reporting Period)	For fully & partially-mechanized FOCs, the stop time should be the date and time stamp of the outgoing EDI/TAG message going to the CLEC. For non-mechanized, the stop time should be the outgoing date & time stamp of the fax, assuming fax server issue is resolved.	Disaggregation should be modified to reflect the following: - Resale Business - Resale Residences - Resale Specials - UNE P - UNE L with NP - UNE L without NP - Standalone LNP - Other UNEs - Trunks - Switching - Transport	How is after hours time treated for manual or partially mechanized FOCs?	No retail analog provided. If retail analog is not provided, the following benchmarks are recommended: Mechanized – 1 hour Partially Mechanized – 5 hours Manual – 24 hours
Speed of Answer in Ordering Center	(Total time in seconds to reach LCSC)/(Total # of Calls) in reporting period.			No measurement of abandoned calls.	Weighted average of residence and business centers inappropriate. AT&T recommends the following benchmark: - Greater than 95% of calls, by center, are answered within 20 seconds - All calls answered within 30 seconds

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
PROVISIONING					
Average Completion Interval	[(Completion Date & Time)-(Order Issue Date & Time)]/(Count of Orders Completed in Reporting Period)	Formula does not comply with the FCC. FCC starting point is when the order is submitted by CLEC to ILEC.	BST should be required to disaggregate in accordance with Attachment C.		AT&T recommends a benchmark in See Attachment C.
Order Completion Interval Distribution	Not required by AT&T.				
Mean Held Order Interval	(Reporting Period Close Date - Committed Order Due Date)/(Number of Orders Pending and Past the Committed Due Date) for all orders pending and past the committed due date.		BST should be required to disaggregate in accordance with Attachment C.	Exclusion of orders cancelled after order is held. BellSouth should only exclude those orders cancelled prior to issuance of held order.	AT&T recommends a retail analog specified in Attachment C.
Held Order Distribution Intervals	(# of Orders Held for 90 days or more)/(Total # of Orders Pending but not Completed) X 100 (# of Orders Held for 15 days or more)/(Total # of Orders Pending but not Completed) X 100		BST should be required to disaggregate in accordance with Attachment C.		AT&T recommends the following benchmark: - Less than 0.1% of orders held for more than 15 calendar days - No orders held for more than 90 calendar days
Average Jeopardy Notice Interval	[(Date and Time of Scheduled Due Date on Service Order)-(Date and Time of Jeopardy Notice)]/(Number of Orders in Jeopardy in Reporting Period)		BST should be required to disaggregate in accordance with Attachment C.	Exclusion of orders cancelled after jeopardy notice issued and non-mechanized orders. BST should only exclude orders cancelled prior to issuance of jeopardy notice. BST should not exclude non-mechanized orders from this measurement.	AT&T recommends a retail analog specified in Attachment C.
% of Orders Given Jeopardy Notices	Numbers of Orders Given Jeopardy Notices in Reporting Period/Numbers of Orders Confirmed in Reporting Period		BST should be required to disaggregate in accordance with Attachment C.	Exclusion of orders cancelled after jeopardy notice issued and non-mechanized orders. BST should only exclude orders cancelled prior to issuance of jeopardy notice. BST should not exclude non-mechanized orders from this measurement.	AT&T recommends a retail analog specified in Attachment C.

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
Percent Missed Installation Appointments	(Number of Orders missed in Reporting Period)/(Number of Orders Completed in Reporting Period) X 100	Formula does not comply with the FCC which requires that orders be reported that are not completed within the completed date and time. The time of the appointment is not included. BST should be required to modify its formula to include time as well as date. BST's report needs to be modified so that the percentage of BST-caused missed appointments is clearly indicated.	BST should be required to disaggregate in accordance with Attachment C.	Exclusion of orders cancelled after missed appointment. BST should only exclude orders cancelled prior to the missed appointment..	AT&T recommends a retail analog specified in Attachment C.
% Provisioning Troubles within 30 days of Service Order Activity	(Trouble reports on all completed orders 30 days or less following service order(s) completion)/(All Service Orders completed in a calendar month) X 100		BST should be required to disaggregate in accordance with Attachment C.	The exclusion of cancelled orders should be removed from the SQM as cancelled orders are not part of the population of data measured..	AT&T recommends a retail analog specified in Attachment C.
Average Coordinated Customer Conversion Interval	[(Completion Date and Time for Cross Connection of an Unbundled Loop)-(Disconnection Date and Time of an Unbundled Loop)]/Total Number of Unbundled Loop Orders for the reporting period.			The exclusion of cancelled orders should be removed from the SQM as cancelled orders are not part of the population of data measured.	

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
Average Completion Notice Interval	Sum of [(Date & Time of Notice of Completion)-(Date & Time of Work Completion)]/(Number of Orders Completed in Reporting Period)	Unclear where (in what system) the ending time located. Business rules do not appear to match calculation. The stop time should be the date and time stamp of the outgoing EDI/TAG message going to the CLEC.	BST should be required to disaggregate in accordance with Attachment C.	BST is not providing notice on manual orders .BST provides other performance measurements on non-mechanized orders. Exclusion of D&F orders. BST should be required to provide completion notices for manual orders. BST should be required to provide notice on disconnect orders as this is how AT&T knows when BST should stop billing AT&T and AT&T will know when to stop billing the customer.	AT&T recommends a retail analog specified in Attachment C.
OSS Interface Availability	(Actual system functional Availability)/(Actual Planned Availability) X 100	The definition does not match the business rule. The definition appropriately incorporates both the legacy and interface systems and the business rule does not.	BST needs to report the actual available hours and scheduled hours for themselves as well as for the CLECs.		
OSS Response Interval	[(Query Response Date and Time for Category "x") – (Query Request Date and Time for Category "X")]/(Number of queries submitted in the reporting period)	Start and stop times are unclear. At what point in which system is the time stamp data gathered? BST should be required to provide an average interval.			
Average Answer Time for BST Repair Centers	(Total time in seconds for BST Repair Centers response)/(Total number of calls) by reporting period				.AT&T recommends adopting the LCUG benchmark of 95% of calls by center are answered within 20 seconds or 100% of calls are answered within 30 seconds.
Customer Trouble Report Rate	(Count of Initial and Repeated Trouble Reports in the Current Period)/(Number of Service Access Lines in Service at End of the Report Period) X 100.	How is UNE with LNP reported?	BST should be required to disaggregate in accordance with Attachment C.		AT&T recommends analogs in Attachment C.

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
Percentage of Missed Repair Appointments	(Count of Customer Troubles not Resolved by the Quoted Resolution Time and Date)/(Count of Customer Trouble Tickets Closed) X 100		BST should be required to disaggregate in accordance with Attachment C.		AT&T recommends analogs in Attachment C.
Maintenance Average Duration	[(Date and time of service restoration) – (Date and Time trouble ticket was opened) / (Total Closed Troubles in the reporting period of Trouble Reports)]/(Total Closed Troubles) in reporting period	Calculation does not follow FCC or LCUG. The end time specified is different from both LCUG & FCC. According to the FCC's NPRM, the trouble clock should be stopped when the CLEC is notified.	BST should be required to disaggregate in accordance with Attachment C.	Trouble reports greater than 10 days should not be excluded.	AT&T recommends analogs in Attachment C.
Percent Repeat Troubles within 30 Days	(Total Repeated Trouble Reports within 30 Days)/(Total Closed Troubles) in reporting period X 100	BST's calculation is inappropriate. The denominator should represent the total trouble reports received in the reporting period. This complies with the NPRM.	BST should be required to disaggregate in accordance with Attachment C.		AT&T recommends analogs in Attachment C.
Out of Service (OOS) > 24 Hours	Not required by AT&T.				

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
BILLING					
Invoice Accuracy	[(Total Billed Revenues during current month) - (Total Adjustment Revenues during current month)/Total Billed Revenues during current month]X 100	The calculation should be modified to reflect the accuracy of the content as opposed to the revenue adjustments. This need is exacerbated by BellSouth's ability to unilaterally deny claims for adjustments. The formula should be revised to; (Number of invoices delivered in the reporting period that have complete information, reflect accurate calculations and are properly formatted) / Total number of invoices issued in the Reporting Period			
Mean Time to Deliver Invoices	Sum of [(Invoice Transmission Date)-(Date of Scheduled Bill Close)]/(Count of Invoices Transmitted in Reporting Period)				
Usage Data Delivery Accuracy	(Total number of usage data packs sent during current month)-(Total number of usage data packs requiring retransmission during current month)/Total number of usage data packs sent during current month	This measure does not measure usage data accuracy. This measure needs to be modified to measure: (Number of usage records delivered in the reporting period that reflected complete information content and proper formatting) / Total number of usage records transmitted) x 100			
Usage Data Delivery Completeness	(Total number of Recorded usage records delivered during the current month that are within thirty (30) days of the message(usage record) create date)/(Total number of Recorded usage records delivered during the current month)	Business rules do not match calculation. This measure should be modified to provide an average delivery interval.			

ATTACHMENT B

Key Deficiencies in BellSouth's 09/15/99 Service Quality Measures

Measurement Title	Calculation or Formula	Business Rule/Formula Issues/Recommendations	Disaggregation Issues/Recommendations	Exclusion Issues/ Recommendations	Performance Standards Issues/ Recommendations
Usage Data Delivery Timeliness	(Total number of usage records sent within six (6) calendar days from initial recording/receipt)/(Total number of usage records sent)				

Attachment C

Selected Product Disaggregation, Benchmarks and Retail Analogs

Attachment C

Product Disaggregation, Benchmarks and Retail Analogs

Product Disaggregation	Benchmark (95% within X Days used for Order Completion Interval	Retail Analog used for other Provisioning and Maintenance & Repair Measures
2 Wire Analog and Digital Loops and Number Portability (1 – 10)	3 days	POTS
2 Wire Analog and Digital Loops and Number Portability (11 – 20)	7 days	POTS
2 Wire Analog and Digital Loops and Number Portability (20 +)	10 days	POTS
DS1 loop (includes PRI) (1 –10)	3 days	DS1
DS1 loop (includes PRI) (11 - 20)	7 days	DS1
DS1 loop (includes PRI) (20 +)	10 days	DS1
xDSL loop (1 – 10)	3 days	DS1
xDSL loop (11 –20)	7 days	DS1
xDSL loop (20 +)	10 days	DS1
Switch Ports – Analog Port	2 days	POTS
Switch Ports – BRI Port (1 – 50)	3 days	ISDN
Switch Ports – BRI Port (50 +)	5 days	ISDN
Switch Ports – PRI Port (1 – 20)	5 days	ISDN
Switch Ports – PRI Port (20 +)	10 days	ISDN
DS1 Trunk Port (1- 10)	3 days	DS1
DS1 Trunk Port (11 – 20)	5 days	DS1
DS1 Trunk Port (20 +)	ICB	DS1
Dedicated Transport (DS0, DS1, and DS3) (1 –10)	3 days	DS1/3
Dedicated Transport (DS0, DS1, and DS3) (11 – 20)	5 days	DS1/3
Dedicated Transport (DS0, DS1, and DS3) (20 +) and all other types	ICB	DS1/3
All Resale	Retail Analog	Retail Service
Loop Port Combinations	Retail Analog	POTS as applicable
Stand-alone Number Portability	2-3 days	POTS as applicable
EELs (Example - DS1 loop and transport) (1 – 10)	3 days	DS1

Attachment D

Appropriate Statistical Methodology

Florida Public Service Commission
Attachment D

Local Competition Users Group

Statistical Tests for Local Service Parity

February 6, 1998
Membership: AT&T, Sprint, MCI, LCI, WorldCom

Version 1.0

Executive Summary

The Local Competition Users Group has drafted 27 Service Quality Measurements (SQMs) that will be used to measure parity of service provided by incumbent local exchange carriers (ILECs) to competitive local exchange carriers (CLECs). This set of measures includes means, proportions, and rates of various indicators of service quality. This document proposes statistical tests that are appropriate for determining if parity is being provided with respect to these measurements.

Each month, a specified report of the 27 SQMs will be provided by the ILEC, broken down by the requested reporting dimensions. The SQMs are to be systematically developed and provided by the ILECs as specified. Test parameters will be calculated so that the overall probability of declaring the ILEC to be out of parity purely by chance is very small. For each SQM and reporting dimension reported, the difference between the ILEC and CLEC results is converted to a z-value. Non-parity is determined if a z-value exceeds a selected critical value.

Introduction

Purpose

The Local Competition Users Group (LCUG) is a cooperative effort of AT&T, MCI, Sprint, LCI and WorldCom for establishing standards for the entry of new companies (competitive local exchange carriers, or CLECs) into the local telecommunications market. A key initiative of the LCUG is to establish measures of parity for services provided by incumbent local exchange carriers (ILECs). In short, parity means that the support ILECs provide on behalf of the CLECs is no lesser in quality than the service provided by the ILECs to their own customers.

The LCUG has drafted a document listing service quality measurements (SQMs) that must be reported by the ILECs to insure that CLECs are given parity of suppport. The SQM document has been submitted to the FCC and made available to PUCs in all 50 states and is pending approval by many of these regulatory agencies. This document has been drafted to describe statistical methodology for determining if parity exists based on the measurements defined in the SQM document.

Service Quality Measurements

The LCUG has identified 27 service quality measurements for testing parity of service. These are:

Category	ID	Description
Pre-Ordering	PO-1	Average Response Interval for Pre-Ordering Information
Ordering and Provisioning	OP-1	Average Completion Interval
	OP-2	Percent Orders Completed on Time
	OP-3	Percent Order Accuracy
	OP-4	Mean Reject Interval
	OP-5	Mean FOC Interval
	OP-6	Mean Jeopardy Interval
	OP-7	Mean Completion Interval
	OP-8	Percent Jeopardies Returned
	OP-9	Mean Held Order Interval
	OP-10	Percent Orders Held >= 90 Days
	OP-11	Percent Orders Held >= 15 Days
Maintenance and Repair	MR-1	Mean Time to Restore
	MR-2	Repeat Trouble Rate
	MR-3	Trouble Rate
	MR-4	Percentage of Customer Troubles Resolved Within Estimate
General	GE-1	Percent System Availability
	GE-2	Mean Time to Anser Calls
	GE-3	Call Abandonment Rate
Billing	BI-1	Mean Time to Provide Recorded Usage Records
	BI-2	Mean Time to Deliver Invoices
	BI-3	Percent Invoice Accuracy

	BI-4	Percent Usage Accuracy
Operator Services and Directory Assistance	OSDA-1	Mean Time to Answer
Network Performance	NP-1	Network Performance Parity
Interconnect / Unbundled Elements and Combos	IUE-1	Function Availability
	IUE-2	Timeliness of Element Performance

The Service Quality Measurements document describes the importance of each measure as an indicator of service parity. The SQM document also describes reporting dimensions that will be used to break each measure out by like factors (*e.g.*, major service group).

Why We Need to Use Statistical Tests

The Telecommunications Act of 1996 requires that ILECs provide nondiscriminatory support regardless of whether the CLEC elects to employ interconnection, services resale, or unbundled network elements as the market entry method. It is essential that CLECs and regulators be able to determine whether ILECs are meeting these parity and nondiscriminatory obligations. In order to make such a determination, the ILEC's performance for itself must be compared to the ILEC's performance in support of CLEC operations; and the results of this comparison must demonstrate that the CLEC receives no less than equal treatment compared to that the ILEC provides to its own operations. Where a direct comparison to analogous ILEC performance is not possible, the comparative standard is the level of performance that offers an efficient CLEC a meaningful opportunity to compete.

When making the comparison of ILEC results to CLEC results, it is necessary to employ comparative procedures that are based upon generally accepted statistical procedures. It is important to use statistical procedures because all of the ILEC-CLEC processes that will be measured are processes that contain some degree of randomness. Statistical procedures recognize that there is measurement variability, and assist in translating results data into useful decision-making information. A statistical approach allows for measurement variability while controlling the risk of drawing an inappropriate conclusion (*i.e,* a "type 1" or "type 2" error, discussed in the next section).

Basic Concepts and Terms

Populations and Samples

Statistical procedures will permit a determination whether the support that the ILECs provide to CLECs is indistinguishable from the support provided by the ILECs to their own customers. In statistical terms, we will determine whether two "samples", the ILEC sample and the CLEC sample, come from the same "population" of measurements.

The procedures described in this paper are based on the following assumption: *When parity is*

provided, the ILEC data and CLEC data can both be regarded as samples from a common population of possible outcomes. In other words, if parity exists, the measured results for a CLEC should not be distinguishable from the measured results for the ILEC, once random variability is taken into account. Figure 1 illustrates this concept. On the right side of the figure are histograms of two samples. In this illustration, the ILEC sample contains 200 observations (data values) and the CLEC sample contains 50. Note that the two histograms are not exactly alike. This is due to sampling variation. The assumption that parity exists implies that both samples were drawn from the same population of values. If it were possible to observe this population completely, the population histogram might appear as shown on the left of the Figure. If the samples were indeed taken from this population, histograms drawn for larger and larger samples would look more and more like the population histogram. Figure 1 shows that even when parity is being provided, there will be differences between the samples due to sampling variability. Statistical tests quantify the differences between the two samples and make proper allowance for sampling variability. They assess the chance that the differences that are observed are due simply to sampling variability, if parity is being provided.

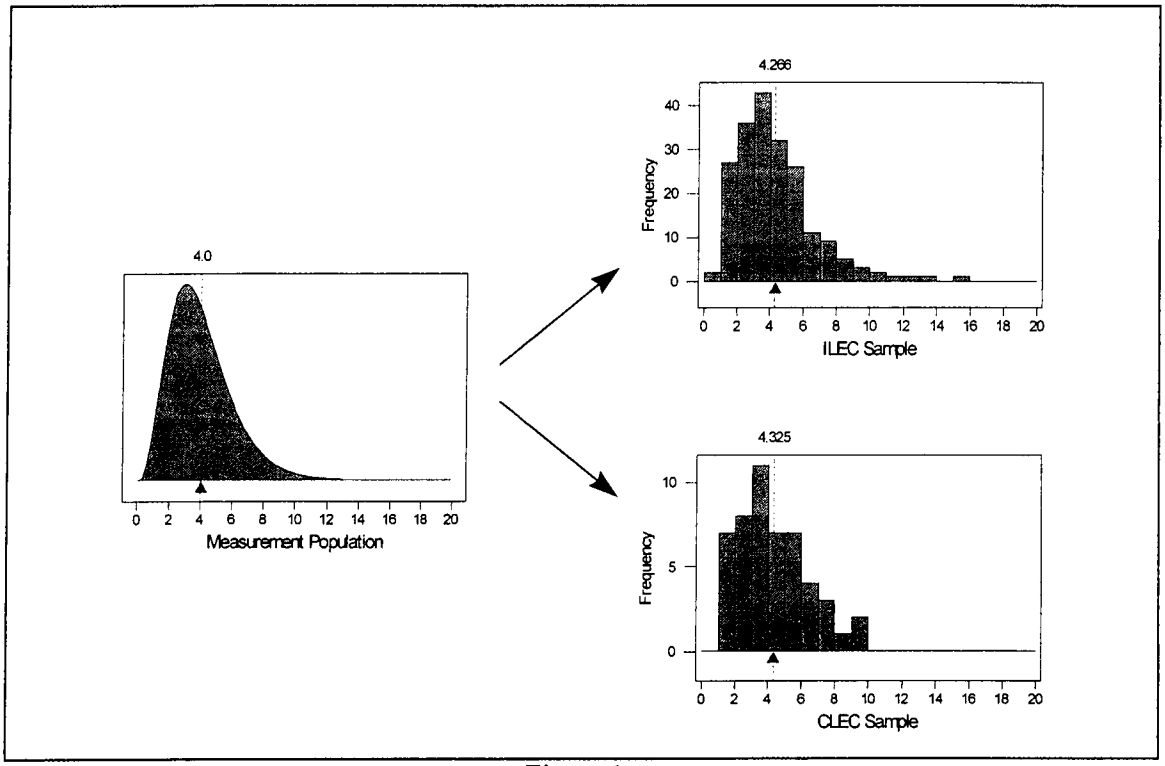

Figure 1.

Measures of Central Tendency and Spread

Often, distributions are summarized using "statistics." For the purpose of this paper, a "statistic" is simply a calculation performed on a sample set of data. Two common types of statistics are known as measures of "central tendency" and "spread."

A measure of central tendency is a summary calculation that describes the middle of the distribution in some way. The most common measure of central tendency is called the "mean" or "average" of the distribution. The mean of a sample is simply the sum of the data values divided by the sample size (number of observations). Algebraically, this calculation is expressed as

$$\bar{x} = \frac{\Sigma x}{n},$$

where x denotes a value in the sample and n denotes the sample size. The mean describes the center of the distribution in the following way: *If the histogram for a sample were a set of weights stacked on top of a flat board placed on top of a fulcrum (a "see-saw"), the mean would be the position along the board at which the board would balance.* (See Figure 1.) The mean in Figure 1 is indicated by the small triangle at approximately the value "4" on the horizontal axis.

A measure of spread is a summary calculation that describes the amount of variation in a sample. A common measure of spread is a called the "standard deviation" of the sample. The standard deviation is the typical size of a deviation of the observations in the sample from their mean value. The standard deviation is calculated by subtracting the mean value from each observation in the sample, squaring the resulting differences (so that negative and positive differences don't offset), summing the squared differences, dividing the sum by one less than the sample size, then taking the square root of the result. Algebraically, this calculation is expressed as

$$\sigma = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}.$$

While the notion of mean and standard deviation exists for populations as well as samples, the mathematical definition for the mean and standard deviation for populations is beyond the scope of this paper. However, their interpretation is generally the same as for samples. In fact, for very large samples, the sample mean and sample standard deviation will be very close to the mean and standard deviation of the population from which the sample was taken.

Sampling Distribution of the Sample Mean

In Figure 1 we showed the positions of the means of the population and the two samples with triangular symbols beneath the distributions. If we sample over successive months, we will get new ILEC samples and new CLEC samples each and every month. These samples will not be

exactly like the one for the first month; each will be influenced by sampling variability in a different way. In Figure 2, we show how sets of 100 successive ILEC means and 100 successive CLEC means might appear. The ILEC means can be thought of as being drawn from a population of sample means; this population is called the "sampling distribution" of these ILEC means. This sampling distribution is completely determined by the basic population of measurements that we start with, and the number of observations in each sample. The sampling distribution has the same mean as the population.

Figure 2 illustrates two important statistical concepts:

1. The histogram of successive sample means resembles a bell-shaped curve known as the Normal Distribution. This is true even though the individual observations came from a skewed distribution.
2. The standard deviation of the distribution of sample means is much smaller than the standard deviation of the observations themselves. In fact, statistical theory establishes the fact that the standard deviation on the population of means is smaller by a factor $\sqrt{n}$, where n is the sample size. This effect can be seen in our example: the distribution of the CLEC means is twice as broad as the distribution of the ILEC means, since the ILEC sample size (200) is four times as large as the CLEC sample size (50).

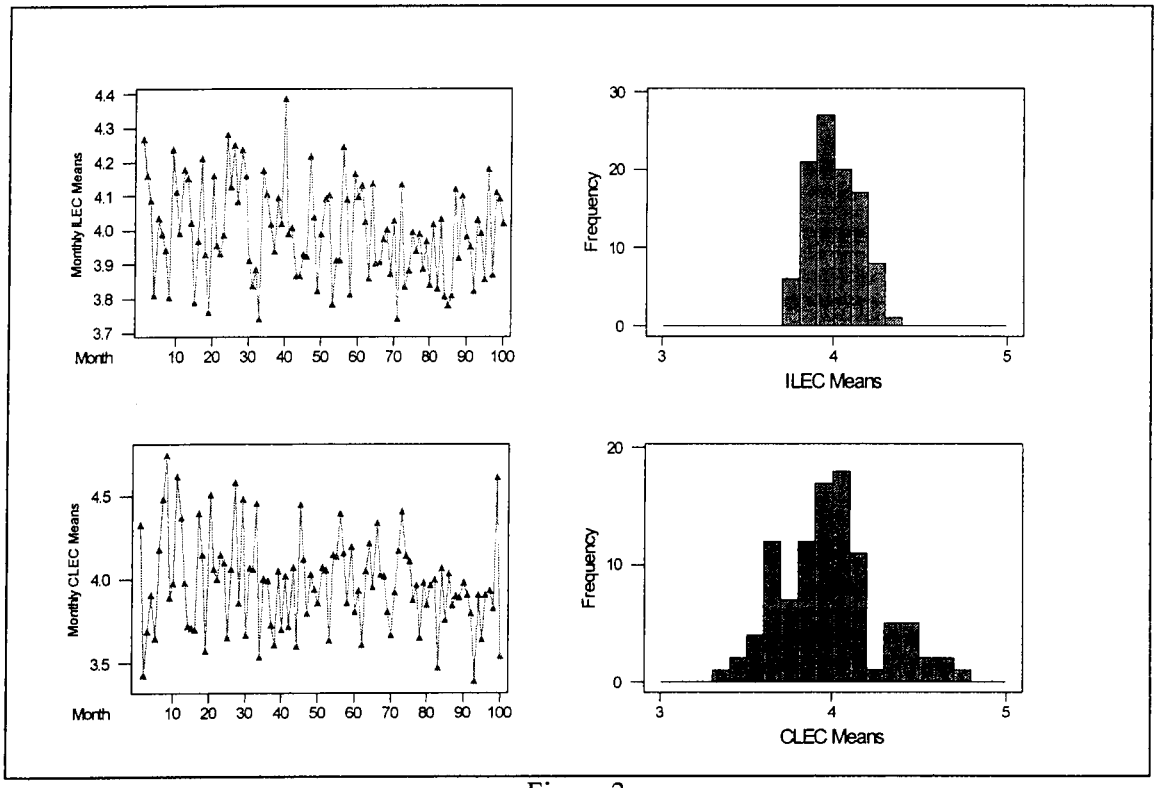

Figure 2.

It is common to call the standard deviation of the sampling distribution of a statistic the "standard error" for the statistic. We shall adopt this convention to avoid confusion between the standard deviation of the individual observations and the standard deviation (standard error) of the

statistic. The latter is generally much smaller than the former. In the case of sample means, the standard error of the mean is smaller than the standard deviation of the individual observations by a factor of $\sqrt{n}$.

The Z-test

Our objective is to compare the mean of a sample of ILEC measurements with the mean of a sample of CLEC measurements. Suppose both samples were drawn from the same population; then the difference between these two sample means (*i.e.*, $DIFF = \bar{x}_{CLEC} - \bar{x}_{ILEC}$) will have a sampling distribution which will

(i) have a mean of zero; and
(ii) have a standard error that depends on the population standard deviation and the sizes of the two samples.

Statisticians utilize an index for comparing measurement results for different samples. The index employed is a ratio of the difference in the two sample means (being compared) and the standard deviation estimated for the overall population. This ratio is known as a z-score. The z-score compares the two samples on a standard scale, making proper allowance for the sample sizes.

The computation of the difference in the two sample means is straightforward.

$$DIFF = \bar{x}_{CLEC} - \bar{x}_{ILEC}$$

The standard deviation is less intuitive. Nevertheless, statistical theory establishes the fact that

$$\sigma^2_{DIFF} = \frac{\sigma^2}{n_{CLEC}} + \frac{\sigma^2}{n_{ILEC}},$$

where σ is the standard deviation of the population from which both samples are drawn. That is, the squared standard error of the difference is the sum of the squared standard errors of the two means being compared.[1]

We do not know the true value of the population σ, because the population cannot be fully observed. However, we can estimate σ given the standard deviation of the ILEC sample (σ_{ILEC}).[2] Hence, we may estimate the standard error of the difference with

$$\sigma_{DIFF} = \sqrt{\frac{\sigma^2_{ILEC}}{n_{CLEC}} + \frac{\sigma^2_{ILEC}}{n_{ILEC}}} = \sqrt{\sigma^2_{ILEC}\left[\frac{1}{n_{CLEC}} + \frac{1}{n_{ILEC}}\right]}$$

[1] Winkler and Hays, *Probability, Inference, and Decision.* (Holt, Rinehart and Winston: New York), p. 370.
[2] Winkler and Hays, *Probability, Inference, and Decision.* (Holt, Rinehart and Winston: New York), p. 338.

If we then divide the difference between the two sample means by this estimate of the standard deviation of this difference, we get what is called a "*z*-score".

$$z = \frac{DIFF}{\sigma_{DIFF}}$$

Because we assumed that both samples were in fact drawn from the same population, this *z*-score has a sampling distribution that is very nearly Standard Normal, *i.e.*, having a mean of zero and a standard error of one. Thus, the *z*-score will lie between ± 1 in about 68% of cases, will lie between ± 2 in about 95% of cases, and will lie between ± 3 in about 99.7% of cases, always assuming that both samples come from the same population. Therefore, one possible procedure for checking whether both samples come from the same population is to compare the *z*-score with some cut-off value, perhaps +3. For comparisons where the values of z exceed the cutoff value, you reject the assumption of parity as not proven by the measured results. This is an example of a statistical test procedure. It is a formal rule of procedure, where we start with raw data (here two samples, ILEC measurements and CLEC measurements), and arrive at a decision, either "conformity" or" violation".

Type 1 Errors and Type 2 Errors

Each statistical test has two important properties. The first is the probability that the test will determine that a problem exists when in fact there is none. Such a mistaken conclusion is called a type one error. In the case of testing for parity, a type one error is the mistake of charging the ILEC with a parity violation when they may not be acting in a discriminatory manner. The second property is the probability that the test procedure will not identify a parity violation when one does exist. The mistake of not identifying parity violation when the ILEC is providing discriminatory service is called a type two error. A balanced test is, therefore, required.

From the ILEC perspective, the statistical test procedure will be unacceptable if it has a high probability of type one errors. From the CLEC perspective, the test procedure will be unacceptable if it has a high probability of type two errors.

Very many test procedures are available, all having the same probability of type one error. However the probability of a type two error depends on the particular kind of violation that occurs. For small departures from parity, the probability of detecting the violation will be small. However, different test procedures will have different type two error probabilities. Some test procedures will have small type two error when the CLEC mean is larger than the ILEC mean, even if the CLEC standard deviation is the same as the ILEC standard deviation, while other procedures will be sensitive to differences in standard deviation, even if the means are equal. Our proposals below are designed to have small type two error when the CLEC mean exceeds the ILEC mean, whether or not the two variances are equal.

Tests of Proportions and Rates

When our measurements are proportions (*e.g.* percent orders completed on time) rather than measurements on a scale, there are some simplifications. We can think of the "population" as being analogous to an urn filled with balls, each labeled either 0(failure) or 1(success). In this population, the fraction of 1's is some "population proportion". Making an observation corresponds to drawing a single ball from this urn. Each month, the ILEC makes some number of observations, and reports the ratio of failures or successes to the total number of observations; the ILEC does the same does the same for the CLEC. The situation is very similar to that discussed above; however, rather than a wide range of possible result values, we simply have 0's (failures) and 1's (successes). The "sample mean" becomes the "observed proportion", and this will have a sampling distribution just as before. The novelty of the situation is that now the population standard deviation is a known function of the population proportion[3]; if the population proportion is p, the population standard deviation is $\sqrt{p(1-p)}$, with similar simplifications in all the other formulas.

There is a similar simplification when the observations are of rates, *e.g.*, number of troubles per 100 lines. The formulas appear below.

Proposed Test Procedures

Applying the Appropriate Test

Three z-tests will be described in this section: the "Test for Parity in Means", the "Test for Parity in Rates", and the "Test for Parity in Proportions". For each LCUG Service Quality Measurement (SQM), one or more of these parity tests will apply. The following chart is a guide that matches each SQM with the appropriate test.

Preordering Response Interval (PO-1)	**Mean**
Avg. Order Completion Interval (OP-1)	**Mean**
% Orders Completed On Time (OP-2)	**Proportion**
% Order (Provisioning) Accuracy (OP-3)	**Proportion**
Order Reject Interval (OP-4)	**Mean**
Firm Order Confirmation Interval (OP-5)	**Mean**
Mean Jeopardy Interval (OP-6)	**Mean**
Completion Notice Interval (OP-7)	**Mean**
Percent Jeopardies Returned (OP-8)	**Proportion**
Held Order Interval (OP-9)	**Mean**
% Orders Held > 90 Days (OP-10)	**Proportion**
% Orders Held ≥ 15 Days (OP-11)	**Proportion**

[3] Winkler and Hays, *Probability, Inference, and Decision.* (Holt, Rinehart and Winston: New York), p. 212.

Time To Restore (MR-1)	**Mean**
Repeat Trouble Rate (MR-2)	**Proportion**
Frequency of Troubles (MR-3)	**Rate**
Estimated Time To Restore (MR-4)	**Proportion**
System Availability (GE-1)	**Proportion**
Center Speed of Answer (GE-2)	**Mean**
Call Abandonment Rate (GE-3)	**Proportion**
Mean Time to Deliver Usage Records (BI-1)	**Mean**
Mean Time to Deliver Invoices (BI-2)	**Mean**
Percent Invoice Accuracy (BI-3)	**Proportion**
Percent Usage Accuracy (BI-4)	**Proportion**
OS/DA Speed of Answer (OS/DA-1)	**Mean**
Network Performance (NP-1)	**Mean, Proportion**
Availability of Network Elements (IUE-1)	**Mean, Proportion**
Performance of Network Elements (IUE-2)	**Mean, Proportion**

Test for Parity in Means

Several of the measurements in the LCUG SQM document are averages (*i.e.*, means) of certain process results. The statistical procedure for testing for parity in ILEC and CLEC means is described below:

1. Calculate for each sample the number of measurements (n_{ILEC} and n_{CLEC}), the sample means ($\bar{x}_{\text{ILEC}}$ and $\bar{x}_{\text{CLEC}}$), and the sample standard deviations (σ_{ILEC} and σ_{CLEC}).

2. Calculate the difference between the two sample means; if *larger* CLEC mean indicates possible violation of parity, use $DIFF = \bar{x}_{\text{CLEC}} - \bar{x}_{\text{ILEC}}$, otherwise reverse the order of the CLEC mean and the ILEC mean.

3. To determine a suitable scale on which to measure this difference, we use an estimate of the population variance based on the ILEC sample, adjusted for the sized of the two samples: this gives the standard error of the difference between the means as

$$\sigma_{\text{DIFF}} = \sqrt{\sigma^2_{\text{ILEC}}\left[\frac{1}{n_{\text{CLEC}}} + \frac{1}{n_{\text{ILEC}}}\right]}$$

4. Compute the test statistic

$$z = \frac{DIFF}{\sigma_{\text{DIFF}}}$$

5. Determine a critical value c so that the type one error is suitably small.

6. Declare the means to be in violation of parity if $z > c$.

c:	3.58	Critical value for the test

ILEC			CLEC			Test	
n	mean	variance	n	mean	variance	z	Violation
250	4.038	1.9547	50	5.154	23.2035	5.15	YES!

Test for Parity in Proportions

Several of the measurements in the LCUG SQM document are proportions derived from certain counts. The statistical procedure for testing for parity in ILEC and CLEC proportions is described below. It is the same as that for means, except that we do not need to estimate the ILEC variance separately.

1. Calculate for each sample sample sizes (n_{ILEC} and n_{CLEC}), and the sample proportions (p_{ILEC} and p_{CLEC}).

2. Calculate the difference between the two sample means; if *larger* CLEC proportion indicates worse performance, use $DIFF = p_{\text{CLEC}} - p_{\text{ILEC}}$, otherwise reverse the order of the ILEC and CLEC proportions.

3. Calculate an estimate of the *standard error for the difference* in the two proportions according to the formula

$$\sigma_{\text{DIFF}} = \sqrt{p_{\text{ILEC}}(1 - p_{\text{ILEC}})\left[\frac{1}{n_{\text{CLEC}}} + \frac{1}{n_{\text{ILEC}}}\right]}$$

4. Hence compute the test statistic

$$z = \frac{DIFF}{\sigma_{\text{DIFF}}}$$

5. Determine a critical value c so that the type one error is suitably small.

6. Declare the means to be in violation of parity if $z > c$.

Example:

c:	3.58	Critical value for the test

ILEC			CLEC			Test	
num	den	p	num	den	p	z	Violation
5	250	2.00%	7	40	17.50%	6.50	YES!

Test for Parity in Rates

A rate is a ratio of two counts, *num/denom*. An example of this is the trouble rate experience for POTS. The procedure for analyzing measurements results that are rates is very similar to that for proportions.

1. Calculate the numerator and the denominator counts for both ILEC and CLEC, and hence the two rates $r_{ILEC} = num_{ILEC}/denom_{ILEC}$ and $r_{CLEC} = num_{CLEC}/denom_{CLEC}$.

2. Calculate the difference between the two sample rates; if *larger* CLEC rate indicates worse performance, use $DIFF = r_{CLEC} - r_{ILEC}$, otherwise take the negative of this.

3. Calculate an estimate of the *standard error for the difference* in the two rates according to the formula

$$\sigma_{DIFF} = \sqrt{r_{ILEC}\left[\frac{1}{denom_{CLEC}} + \frac{1}{denom_{ILEC}}\right]}$$

4. Compute the test statistic

$$z = \frac{DIFF}{\sigma_{DIFF}}$$

5. Determine a critical value c so that the type one error is suitably small.

6. Declare the means to be in violation of parity if $z > c$.

Example:

c: 3.58 Critical value for the test

ILEC			CLEC			Test	
num	den	rate	num	den	rate	z	Violation
250	610	0.409836	34	30	1.133333	6.04	YES!