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July 23, 2002

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Ms Blanca S. Bayó , Director
Division of the Commission Clerk and Administrative Services
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

RE Docket 000121B

Dear Ms Bayó

Enclosed for filing are the original and fifteen copies of Sprint's Supplemental Comments in the above captioned docket

Copies of this have been served pursuant to the attached Certificate of Service

Please acknowledge receipt and filing of the above by stamping the duplicate copy of this letter and returning the same to this writer

Thank you for your assistance in this matter

Sincerely,

Susan S Masterton

Susan S Masterton

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Enclosures

cc Lisa Harvey

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing has been furnished by hand delivery (*) or U S mail to all known parties of record this 23rd day of July, 2002.

Jason Fudge*
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Susan S. Masterton
Susan S. Masterton

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Investigation into the Establishment Of Operations Support Systems Permanent Performance Measures for Incumbent Local Exchange Telecommunications Companies	))))	Docket No.: 000121B-TP Filed:

SUPPLEMENTAL COMMENTS OF SPRINT CORPORATION

I. INTRODUCTION AND SUMMARY

As requested by the Florida Public Service Commission Staff on April 12, 2002, Sprint provided preliminary information including the Nevada stipulated Performance Measurement Plan and Performance Incentive Plan, and a partial list of proposed changes. In these Supplemental Comments, Sprint wishes to clarify its position that because the FCC has an open docket addressing national performance measures (CC Docket No. 01-318), the Florida Public Service Commission (FPSC) should not adopt a Florida-specific Performance Measurement Plan for Sprint. Rather, the Commission should defer activity in this Docket pending the outcome of the federal docket and adopt the FCC's national performance measures. National performance measures will serve to reduce regulatory burdens on incumbent carriers as well as their carrier-customers.

Sprint supports, with minor modifications and additions, the performance measurements proposed by the FCC. Sprint asserts that these performance measurements should not be adopted as minimum rules or guidelines; but rather, as national rules that apply, without modification, throughout the nation. These national rules must be

accompanied by enforcement mechanisms for the RBOCs but self-effectuating enforcement mechanisms are not necessary and are not recommended for the independent ILECs such as Sprint.

II. FCC PROCEEDING TO ESTABLISH PERFORMANCE STANDARDS

In November 2001, the FCC began a rulemaking proceeding to establish a core set of national performance measurements and standards for incumbent local exchange carriers (ILECs). The FCC's Notice of Proposed Rulemaking (CC Docket No 01-318) seeks to identify a list of key performance measurements and standards for evaluating an ILEC's performance in provisioning wholesale facilities and services to competitors.

In undertaking this rulemaking, the FCC desired to create certainty in the marketplace by providing all carriers with bright line guidance about whether an incumbent LEC has provided interconnection, collocation and access to UNEs in a nondiscriminatory manner. Further, the FCC desired to reduce reporting costs and minimize regulatory burdens by streamlining, standardizing, and simplifying the potentially divergent federal and state regulatory requirements.

The FCC's NPRM offered a core set of twelve specific performance measurements and sought comment on related issues of implementation, reporting requirements and enforcement mechanisms. The FCC's proposed measurements would provide information for each of the four basic functions that competitors obtain from ILECs: pre-ordering, ordering, provisioning and maintenance and repair.

The FCC received comments and reply comments on its proposal from a wide cross-section of interested parties. Based on this input, the FCC is expected to propose national

performance measurements for evaluating ILEC performance in the provisioning of services to CLECs.

III. FINAL AND CERTAIN NATIONAL RULES CAN BE AND MUST BE ADOPTED

Varying, and sometimes conflicting, state interpretations of the 1996 Act and accompanying FCC Rules produce greater expense and resource utilization (people and systems) for the incumbents that must comply and, significantly, for their carrier-customers that try to compete in multiple states. Rather than foster competition, conflicting regulatory rules and standards actually hinder competition by creating multiple standards that the incumbents and carrier-customers must implement, support, and monitor. The FCC itself acknowledges this problem:

> The absence of a clear set of federal standards, however, makes it harder to detect and resolve inconsistent federal and state approaches to compliance with the Act, **and the proliferation of differing state requirements may impose increasingly divergent and costly requirements on carriers.** [Emphasis supplied.][1]

This problem exists today with regard to UNE Performance Measurements. Performance measurements have been addressed in various generic state proceedings or merger conditions to date, and it is clear that this approach has resulted in significant inconsistencies in the types of measurements, standards and penalties that will be applied. Inconsistencies drive up implementation costs for all parties, whereas, consistency allows for replication which leads to more efficient implementation.

[1] FCC Notice of Proposed Rulemaking; Performance Measurements and Standards for Unbundled Network Elements and Interconnection; CC Docket No. 01-318, at para. 4.

The FCC states that it has the legal authority to adopt such rules. Sprint agrees. As the Supreme Court stated, "201(b) *explicitly* gives the FCC jurisdiction to make rules governing matters to which the 1996 Act applies."[2] To have any meaning or true function, this authority must extend, not only to adopting a national list of UNEs under Section 251 of the Act, but also to measurements of compliance with the Act's nondiscriminatory standard for provisioning UNEs.[3]

The FCC's initiative addresses the same issues that this docket was established to address. Sprint encourages the FPSC to defer action in this proceeding to provide an opportunity for the FCC to establish national performance measurements, which are likely to address all of the objectives the FPSC had for this proceeding.

IV. SPECIFIC PERFORMANCE MEASUREMENTS AND STANDARDS

The FCC proposes twelve specific performance measurements. Sprint supports the FCC's proposal with minor modifications and additions. A completed model for each of the proposed performance measurements is attached hereto as Exhibit A. Unless otherwise noted, reporting should be done monthly, with a twenty day lag time between the end of the month and the report due date, and on a state-wide basis. Disaggregation levels, exclusions, and business rules for each measurement are set forth in Exhibit A.

[2] AT&T Corporation, et al. V. Iowa Utilities Board et al., 525 U.S. 366,378 (1999)

[3] 47 U.S.C. § 251(c)(3).

As reflected in Exhibit A, the appropriate standard is parity -- a comparison of what the ILEC provides for the carrier-customer and what the ILEC provides itself, its affiliates, and other CLECs. Where a retail analog exists, this parity standard is the sole means to demonstrate compliance with the Act's nondiscriminatory standard. Where a retail analog does not exist, a benchmark standard should be adopted. To be meaningful, the reports should provide the ILEC's performance for itself; for its affiliates; for all carrier-customers; and, subject to appropriate proprietary controls for carrier-customer sensitive information, for each carrier-customer.

Statistical analysis can be helpful in determining whether reported differences in an ILEC's performance for retail customers and carrier-customers is due to behavior or random chance. Sprint's position on the appropriate statistical testing is set forth on the attached Exhibit B.

The specific performance measurements Sprint recommends are described below:

A. **Pre-Order Measurement.**

1. **OSS Pre-Order Interface Response Timeliness.** Sprint proposes OSS Pre-Order Interface Response Timeliness which is the same as the Pre-Order Measurements proposed by the FCC. This measures the response interval for each pre-ordering query by computing the elapsed time from the ILEC receipt of the query to the time the ILEC returns the requested data to the carrier-customer.

B. **Ordering Measurements.**

1. **FOC Timeliness.** The FCC proposed an Order Notifier Timeliness Measurement. Sprint essentially supports adoption of this measurement, but suggests that it be broken into two separate measurements that will aid the carrier-customer's receipt of

timely performance from the ILEC - something the carrier-customer needs if it, in turn, is to provide timely performance to its end users.

a. **FOC Timeliness Measurement.** Sprint proposes the FOC Timeliness Measurement to track the average time from the ILEC's receipt of a valid service request to the time the ILEC returns a Firm Order Confirmation/Local Service Confirmation.

b. **Reject Timeliness.** Sprint supports adoption of this measurement to track the elapsed time between the ILEC receipt of an order from a carrier-customer and the ILEC's return of a notice of rejection to the carrier-customer.

2. **Order Completion Notifier Timeliness.** Sprint supports adoption of this FCC-proposed measurement. It measures the average time per order the ILEC requires to return a completed order notification to the carrier-customer.

3. **Percent of Jeopardies.** Sprint supports adoption of this FCC-proposed measurement. This measurement tracks the percentage of total orders processed from which the ILEC notifies the carrier-customer that the order will not be completed on the due date set forth in the FOC.

C. **Provisioning Measurements.**

1. **Percentage on Time Performance.** Sprint supports adoption of this FCC-proposed measurement to track the percentage of new, move and change orders for which installation was completed by the due date set forth in the FOC.

2. **Average Delay Days of Missed Installation Orders.** Sprint supports adoption of the FCC-proposed measurement to track, for missed installation orders, the average calendar days from the due date set forth on the FOC to the actual completion date.

3. **Installation Quality.** Sprint supports adoption of this FCC-proposed measurement, with a modification. This measurement proposes determining the percentage of completed order for which carrier-customers report trouble within the first 30 days after completion of the order. As noted above, parity should be the standard wherever a retail analog exists. Some LECs already measure installation quality for themselves, not necessarily based on the first 30 days after completion of the order. Sprint's local division currently measured its quality installation for itself for the first five days following completion of the order. Accordingly, Sprint believes this measurement should be tied to what the ILEC measures for itself. If the ILEC has no current measurement in place, 30 days could be used as the default.
4. **Open Orders in Hold Status.** Sprint supports adoption of this FCC-proposed measurement, which tracks the percentage of delayed orders.
5. **Average Jeopardy Notice Interval.** Sprint proposes this measurement as an additional Provisioning measurement. It measures the remaining time between the pre-existing order completion date and time set forth on the FOC and the time the ILEC issues a notice to the carrier-customer indicating an order is in jeopardy of missing the due date. Timely receipt of jeopardy notices is critical to a carrier-customer's ability to communicate with its end user on the status of their order. Carrier-customers should be receiving these jeopardy notices as quickly as the ILEC's own retail end users (and affiliates) so that the carrier-customers can provide levels of customer service comparable to the ILEC, a necessary ingredient to any carrier-customer's ability to compete.
6. **Average Completion Interval.** Sprint proposes this measurement as an additional Provisioning measurement to track the average number of business days from the

ILEC's receipt of a valid, error-free service request to the completion date for new, move, and change orders. Completion of these orders in a timely fashion is a critical component of a carrier-customer's relationship with its end users. The carrier-customer must provide service on a comparable, nondiscriminatory basis with the ILEC, and this performance measurement will demonstrate whether or not the ILEC is providing nondiscriminatory service levels.

D. **Maintenance and Repair Measurements.**

1. **Trouble Report Rate Measurement.** Sprint supports adoption of this FCC-proposed measurement which tracks the total number of network customer trouble reports received within a calendar month per 100 UNEs.
2. **Repeat Trouble Rate Measurement.** Sprint supports adoption of this FCC-proposed measurement which tracks the percent of customer network trouble reports received within 30 calendar days of a previous report.
3. **Time to Restore Measurement.** Sprint supports adoption of this FCC-proposed measurement which tracks the average duration of carrier-customer trouble reports from the receipt of the trouble report to the time the report is cleared.

E. **Network Performance Measurements.** Sprint proposes one additional measurement to the list proposed by the FCC under the general category of Network Performance. Network Performance tracks the level at which the ILEC provides services and facilitates call processing within its network.

1. **Percent Blocking on Interconnection Trunks.** As a diagnostic measurement only (i.e. Sprint does not believe enforcement mechanisms are necessary for this measurement) Sprint proposes this measurement to track the percent of final dedicated interconnection trunk groups exceeding 2% blockage. The quality of

interconnection trunks is integral to a carrier-customer's ability to effectively utilize UNEs and provide a quality service, comparable to the ILEC's. To solely look at the performance levels related to UNEs - without also reviewing the quality of the interconnection trunks, will provide an incomplete picture at of whether the ILEC is truly providing services and facilities on a nondiscriminatory basis.

F. **Billing Measurements.** Sprint believes that a Billing Measurement category is essential and proposes two specific measurements. Timely and accurate billing is a critical component of the carrier-customer's ability to compete through UNE-based competition. Any business needs timely and accurate statements of, not just incoming revenue, but of ongoing expenses, such as UNE bills, to be able to operate efficiently and profitably.

1. **Bill Timeliness Measurement.** Sprint proposes adoption of a Bill Timeliness Measurement to capture the elapsed number of calendar days between the scheduled close of a bill cycle and the ILEC's transmission of the associated invoice to the carrier-customer.

2. **Bill Accuracy Measurement.** Sprint proposes adoption of a Bill Accuracy Measurement, as a diagnostic measurement only, to track the percentage of the total bill amount that is not adjusted by correcting service orders or adjustments for the month.

G. **Collocation Performance** - Generally, collocation is the means for carrier-customers to access UNEs. As such, collocation is a critical component in the UNE provisioning process. Timely ILEC collocation responsiveness impacts a carrier-customer's ability to utilize the provisioned UNEs and to enter a market and provide service to new

customers. Accordingly, in addition to specific UNE provisioning performance measurements, Sprint recommends two collocation performance measurements.

1. **Average Time to Respond to a Collocation Arrangement Measurement.** Sprint proposes adoption of this measurement of the average number of calendar days the ILECs requires to respond to complete collocation requests. Sprint proposes that the appropriate standard is ten calendar days from receipt of the application for the ILEC to respond as to the availability of space. The ILEC should have an additional five calendar days to provide a quote.
2. **Average Time to Provide a Collocation Arrangement Measurement.** Sprint proposes adoption of this measurement of the average number of calendar days the ILEC requires to complete (build) a requested collocation arrangement. The appropriate standard is ninety calendar days from the receipt by the ILEC of a completed order -- the date the ILEC receives, in response to the ILEC's price quote, the carrier-customer's firm order and deposit.

III. ENFORCEMENT MECHANISMS

The FCC NPRM is also considering the establishment of specific enforcement policies, including self-effectuating remedies for responding to violations of any national measurements and standards that the Commission adopts. Sprint supports the establishment of specific enforcement mechanisms for the RBOCs, but asserts that such enforcement mechanisms are not necessary or appropriate for the independent ILECs and should not be required.

The concept of enforcement mechanisms is not a case of "one size fits all." There is a long history of treating RBOCs and independent telephone companies differently. To cite

but a few examples: the MFJ applied only to the RBOCs (GTE, which is now a part of Verizon, was subject to a similar GTE-only Consent Decree); Sections 271 and 272 and their implementing regulations apply only to the RBOCs; and the RBOCs are subject to more stringent accounting and reporting requirements than are non-RBOC ILECs.[4] It is illustrative to note that almost all of the enforcement plans associated with UNE performance measurements that have been implemented across the country have been directly related to RBOC 271 proceedings.

The rationale has varied, but generally has focused on the fact that the independents serve primarily rural areas, have widespread and diverse geographic territory, and lack the market power of the RBOCs. Importantly, for this proceeding, most independents have not seen the same degree of competitive activity as the RBOCs. Indeed, in Sprint's incumbent local territory in Florida there are only slightly more than seven thousand UNE loops and UNE-P arrangements. To adopt a bright line test for independent incumbents would, at best, be premature, and at worst, a solution in search of a problem.

For Sprint, the performance standards discussed herein should not function as a bright line, but rather should create a rebuttable presumption of compliance. If Sprint's performance is falling short of meeting the standard, then any carrier customer whose ability to compete is being hindered by this shortfall can file a complaint with the Commission. Sprint would have an opportunity to rebut the presumption that it is violating the performance measurements. If it cannot do so, appropriate enforcement mechanisms can then be imposed on a case by case basis.

[4] See, In the Matter of 2000 Biennial Regulatory Review -- Comprehensive Review of the Accounting Requirements and ARMIS Reporting Requirements for Incumbent Local Exchange Carriers: Phase 2, Report and Order in CC Docket Nos. 00-199, 97-212, and 80-286, Released November 5, 2001.

VII. CONCLUSION

Performance Measurements are necessary to determine whether the ILECs are providing nondiscriminatory provisioning of UNEs in compliance with the Act. A single set of such measurements, to apply to all ILECs in all States, is necessary so as not to overly burden the ILECs or their carrier-customers. Without such a nation-wide single set of measurements there is the possibility that 52 sets of such measurements will be adopted, an untenable situation for all parties. Therefore the Florida Public Service Commission should not adopt a Florida-specific Performance Measurement Plan, but rather should defer to the national performance measures as developed by the FCC.

EXHIBIT A

Performance Measurements and Standards for Unbundled Network Elements and Interconnection

Metric Number: Name:
OSS Pre-Order Interface Response Timeliness
Definition:
The response interval for each pre-ordering query is determined by computing the elapsed time from the ILEC receipt of the query from the CARRIER-CUSTOMER, whether or not syntactically correct, to the time the ILEC returns the requested data to the CARRIER-CUSTOMER
Exclusions:
Business Rules:
• Elapsed time is measured in seconds for electronic pre-order requests • Sprint defines Simple CSR as 4 or less lines and Complex as more than 4 lines.
Levels of Disaggregation:
Query Type: **Mechanized** • Address Verification/Dispatch Required • Request for Telephone Number (TN) • Request for Customer Service Record (Simple, Complex) • Rejected/Failed inquires **Manual** • Facility Availability • Loop Pre-qualification

Metric Number: Name:	
OSS Pre-Order Interface Response Timeliness (continued)	
Calculation:	**Report Structure/Geography:**
Electronic: Sum ((Query Response Date and Time) – (Query Submission Date and Time)) / (Number of Queries Submitted in Reporting Period) **Manual: Loop Pre-qualification, and Facility Availability** Sum ((Fax Date and Time Returned) - (Business Date and Time of receipt of valid fax service request)) / (Number of Faxes Submitted in Reporting Period)	State
Benchmark/Parity Performance Standard:	
Benchmarks, state specific	

Metric Number: Name:
FOC Timeliness
Definition:
Measures the average time from receipt of a valid service request to returning a Firm Order Confirmation (FOC)/Local Service Confirmation (LSC).
Exclusions:
Business Rules:
• Elapsed time calculated in business hours • The start time of requests received after the end of the business day will be the beginning of the next business day Business day is defined as published hours of operation for the ILEC ordering center. • Excludes non-business days and ILEC published holidays. • Excludes Loop Pre-Qualification queries
Levels of Disaggregation:
• Electronically received and manually handled • By Service Group Type • By Designed and Non-Designed FOC process

Calculation:	Report Structure/Geography:
Mechanized: ((Date and Time of FOC/LSC) - (Business Date and Time of Receipt of Valid Service Request)) / (Number of FOCs/LSCs Sent in Reporting Period) **Electronic/Manual Mix:** Sum [(FOC Date and Time – (Receipt Date and Time of receipt of error free order)] / Number of FOCs sent)	State

Benchmark/Parity Performance Standard:
Benchmarks, state specific

Metric Number: Name:
Reject Timeliness
Definition:
Reject interval is the elapsed time between the ILEC receipt of an order from the CARRIER-CUSTOMER to the ILEC return of a notice of a rejection to the CARRIER-CUSTOMER
Exclusions:
• Excludes non-business days and ILEC published holidays • Exclude rejects when the PON is received after business hours and processed prior to the beginning of the next business day • Exclude Loop Pre-Qualification queries created as service orders
Business Rules:
• Elapsed time calculated in business hours. • Calculation of requests received after the end of the business day starts at the beginning of the next business day. Business day is defined as published hours of operation for the ILEC ordering center
Levels of Disaggregation:

• Electronically received, manually handled
  • All interfaces
  • Syntax (edit engine) and content errors (other edits)
  • Facility based/UNE orders

Metric Number: Name:	
Reject Timeliness (continued)	
Calculation:	**Report Structure/Geography:**
Mechanized ((Business Date and Time of ILEC Transmission of Order Rejection) - (Business Date and Time of Order Receipt)) / (# of Mechanized Orders Rejected) Electronic/Manual ((Business Date and Time of ILEC transmission of Order Rejection) – (Business Date and Time of Order Receipt)) / (#of Electronic/Manual Orders Rejected) **Manual** ((Rejection Date and Time) - (Received Date and Time)) / (Number of manual rejections sent in reporting Period)	State
Benchmark/Parity Performance Standard:	
Benchmarks, state specific	

Metric Number: Name:	
Order Completion Notifier Timeliness	
Definition:	
Measures the average time per order to issue notification to CARRIER-CUSTOMER of a completed order	
Exclusions:	
• Excludes weekends and ILEC published holidays • Excludes Loop Pre-Qualification queries	
Business Rules:	
• 24 hour clock is used to measure interval for manual process	
Levels of Disaggregation:	
• All Electronic • Manual/Electronic Mix	
Calculation:	**Report Structure/Geography:**
((Date and Time of Completion Notification to CARRIER-CUSTOMER) - (Date and Time of Work Completion)) / (Number of Orders Completed)	State
Benchmark/Parity Performance Standard:	
Benchmarks, state specific	

Metric Number: Name:	
Percentage of Jeopardies	
Definition:	
Percentage of total orders processed for which the ILEC notifies the CARRIER-CUSTOMER that the work will not be completed as committed on the original FOC.	
Exclusions:	
• Excludes delays for customer reasons • Excludes Loop Pre-Qualification queries.	
Business Rules:	
Levels of Disaggregation:	
By Service Group Types	
Calculation:	**Report Structure/Geography:**
((Number of Orders Jeopardized) / (Number of Orders Completed)) x 100	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:	
Percentage On Time Performance	
Definition:	
Measures the percent of new, move and change orders where installation was completed by the due date	
Exclusions:	
• Excludes customer misses • For UNE Loop services, feature only orders are excluded from the retail analog • Excludes Loop Pre-Qualification queries.	
Business Rules:	
• Due date is defined as either original due date or final due date if the original due date was missed due to customer reasons	
Levels of Disaggregation:	
• By Service Group Types	
Calculation:	**Report Structure/Geography:**
(Total Number of Met Due Dates Due for New, Move and Change Orders / Total Number of New, Move and Change Orders) x 100	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:	
Average Delay Days On Missed Installation Orders	
Definition:	
Measures the average calendar days from due date to completion date on company missed orders	
Exclusions:	
Excludes Loop Pre-Qualification queries	
Business Rules:	
Levels of Disaggregation:	
• By Service Group Types • Disaggregated by 1-30 calendar days, 31-90 calendar days and >90 calendar days	
Calculation:	**Report Structure/Geography:**
(Completion Date - Committed Order Due Date) / (Number of Orders Missed in the Reporting Period)	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:	
Installation Quality	
Definition:	
Measures the percent of network customer trouble reports received within 30 calendar days of service order completion	
Exclusions:	
• Excludes CPE and IEC/CARRIER-CUSTOMER caused troubles • Excludes troubles associated with inside wire • Excludes Trouble Reports Received on the Due Date • Excludes Subsequent reports • Excludes Message Reports (circuit reports for which ILEC has no records) • Excludes ILEC employee generated reports	
Business Rules:	
Levels of Disaggregation:	
By Service Group Types	
Calculation:	**Report Structure/Geography:**
(Total Number of Customer Trouble reports received within 30 calendar days of service order completion / Total Number of new, move and change completed orders) x 100	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:	
Open Orders in Hold Status	
Definition:	
Measures the percentage of orders that are delayed	
Exclusions:	
• Excludes Loop Pre-Qualification queries. • Excludes ILEC test orders, disconnect orders, ILEC administrative orders, orders that are incomplete or cancelled before the due date, orders that have passed the due date and were delayed due to competitive carrier or end-user delay, and orders not assigned a completion date.	
Business Rules:	
Levels of Disaggregation:	
By Service Group Types	
Calculation:	**Report Structure/Geography:**
(Number of Orders received in the current reporting period that are pending or past the committed due date) / (Number of Orders received in the current reporting period) x 100.	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:	
Average Jeopardy Notice Interval	
Definition:	
Measures the remaining time between the pre-existing committed order completion date and time (communicated via the FOC) and the date and time the ILEC issues a notice to the CARRIER-CUSTOMER indicating an order is in jeopardy of missing the due date (or the due date/time has been missed)	
Exclusions:	
• Excludes delays for customer reasons • Excludes Loop Pre-Qualification queries	
Business Rules:	
Levels of Disaggregation:	
• By Service Group Types	
Calculation:	**Report Structure/Geography:**
((Date of Committed Due Date for the Order) - (Date of Jeopardy Notice)) / (Number of Order Jeopardized)	State
Benchmark/Parity Performance Standard:	
Benchmark	

Metric Number: Name:	
Average Completion Interval	
Definition:	
Average business days from receipt of valid, error-free service request to completion date in service order system for new, move, and change orders.	
Exclusions:	
• Excludes customer requested due dates beyond interval offered, and orders delayed for customer reasons • For UNE Loop services, feature only orders are excluded from the retail analog. • Excludes Loop Pre-Qualification queries	
Business Rules:	
Levels of Disaggregation:	
• By Service Group Types	
Calculation:	**Report Structure/Geography:**
Total business days from receipt of valid, error-free service request to completion date in service order system for new, move and change orders / Total new, move and change orders	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:	
Trouble Report Rate	
Definition:	
Measures the total number of network customer trouble reports received within a calendar month per 100 circuits/UNEs.	
Exclusions:	
• Excludes CPE and IEC/CARRIER-CUSTOMER caused troubles • Excludes Subsequent reports • Excludes Message Reports (circuit reports for which ILEC has no records) • Excludes ILEC employee generated reports	
Business Rules:	
Access line/circuit count taken from previous month	
Levels of Disaggregation:	
By Service Group Types	
Calculation:	**Report Structure/Geography:**
(Total Number of Customer initial and repeat network trouble reports / Number of access lines/circuits/UNEs in service at the end of the prior reporting period) x 100	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:	
Repeat Trouble Report Rate	
Definition:	
Measures the percent of customer network trouble reports received within 30 calendar days of a previous report	
Exclusions:	
• Excludes CPE and IEC/CARRIER-CUSTOMER caused troubles • Excludes troubles associated with inside wiring • Excludes Subsequent reports • Excludes Message Reports • Excludes ILEC employee generated reports	
Business Rules:	
Includes LNP NXX Code Opening troubles	
Levels of Disaggregation:	
By Service Group Types	
Calculation:	**Report Structure/Geography:**
(Total customer network trouble reports received within 30 calendar days of a previous customer report / Total customer network trouble reports) x 100	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:	
Time to Restore	
Definition:	
Measures the average duration of customer trouble reports from the receipt of the customer trouble report to the time the trouble is cleared	
Exclusions:	
• Excludes CPE and IEC/CARRIER-CUSTOMER caused troubles • Excludes Subsequent reports • Excludes Message Reports (circuit reports which ILEC has no records on) • Excludes ILEC employee generated reports	
Business Rules:	
Includes LNP NXX Code Opening troubles	
Levels of Disaggregation:	
• By Service Group Types • Dispatch vs No Dispatch	
Calculation:	**Report Structure/Geography:**
(Total duration of customer network trouble reports) / (Total customer network trouble reports)	State
Benchmark/Parity Performance Standard:	
Parity comparison	

Metric Number: Name:
Percent Blockage on Dedicated Interconnection Trunks
Definition:
Measures the percent of final dedicated interconnection trunk groups exceeding 2% blockage.
Exclusions:
• Excludes blocking failures where CARRIER-CUSTOMER doesn't complete their end of augmentation
Business Rules:
• Only measured on trunks where ILEC has outgoing traffic to CARRIER-CUSTOMERs, and where ILEC controls trunk capacity.
Levels of Disaggregation:
none

Calculation:	**Report Structure/Geography:**
(Number of final dedicated interconnection trunk groups exceeding 2% blockage / Total number of final dedicated interconnection trunk groups) x 100	State

Benchmark/Parity Performance Standard:
Diagnostic only

Metric Number: Name:	
Bill Timeliness	
Definition:	
This measure captures the elapsed number of calendar days between the scheduled close of a Bill Cycle and the ILEC's transmission availability of the associated invoice to the CARRIER-CUSTOMER	
Exclusions:	
• Includes only mechanized bills. • Excludes paper bill, magnetic bill, CD ROM bill or Custom Bill diskette bill	
Business Rules:	
Levels of Disaggregation:	
• UNE • Facilities/Interconnection	
Calculation:	**Report Structure/Geography:**
(Count of Invoices where difference between distribution date and bill date is less than or equal to 10) / Count of Total Invoices Distributed within the Reporting Period) x100	State
Benchmark/Parity Performance Standard:	
99% within 10 calendar days (applicable to each disaggregation)	

Metric Number: Name:
Billing Accuracy
Definition:
Measures the percentage of the total bill amount that is not adjusted by correcting service orders or adjustments, for a six month rolling average
Exclusions:
• Excludes late charges resulting from mandated billing changes if Sprint makes its changes on time • Excludes Uncollectable status accounts, restoration charges, non-recurring charges billed in installments, non-regulated charges, refunds of deposits, transfer of payments or balances, returned check charges, taxes, and surcharges • Excludes adjustments issued for reasons not related to bill accuracy
Business Rules:
Levels of Disaggregation:

• UNE – Diagnostic Only
  • Usage
  • Recurring Charges
  • Non-Recurring Charges
• Facilities/Interconnection – Diagnostic Only
  • Usage
  • Recurring Charges
  • Non-Recurring Charges

Calculation:	**Report Structure/Geography:**
(Total monies billed without corrections during current month and 5 prior months / total monies billed during current month and 5 prior months) x 100	State

Benchmark/Parity Performance Standard:
Diagnostic only

Metric Number: Name:
Time to Respond to a Collocation Request
Definition:
Measures the percentage of time the ILEC responds to a CLEC complete collocation request within the allotted time.
Exclusions:
• Excludes orders cancelled by CLEC • Excludes requests/applications that are incomplete and must be returned to CLEC for completion The new completed version counts as a new request • Exclude Collocation requests with non-commission (ICB) approved price list requirements • Excludes requests where Right of Way (ROW) access must be obtained to determine space availability.
Business Rules:
If multiple collocation requests are received on one request, the response interval will be adjusted according to the following 1-9 applications = 15 days 10 – 19 applications = 25 days 20 – 29 applications = 35 days Each additional 10 = 10 additional days
Levels of Disaggregation:
Space Availability: **Physical Caged** **Physical Cageless** **Virtual** **Other** **Price Quote:** **Physical Caged** **Physical Cageless** **Virtual** **Other**

Calculation:	**Report Structure/Geography:**
Space Availability: (Count of Complete Requests returned with 10 calendar days)/(Count of requests returned for Space Availability) x 100 Price Quote (Count of Complete Requests returned within 18 calendar days)/Count of requests returned for Price Quote) x 100	State

Metric Number: Name:
Time to Respond to a Collocation Request (continued)
Benchmark/Parity Performance Standard:
Benchmark: *Space Availability = 100% in 10 Calendar Days* *Price Quote = 95% in 18 Calendar Days*

Metric Number: Name:
Time to Provide a Collocation Arrangement
Definition:
Measures the percentage of time the ILEC responds to a CLEC approved* collocation request within the allotted time *Approved means ILEC approves the application and has received, from CLEC, financial payment or bond.
Exclusions:
• Excludes orders cancelled by CLEC • Excludes requests/applications that are incomplete and must be returned to CLEC for completion • Excludes requests where CLECs failed to provide information and/or materials in a timely manner
Business Rules:
Levels of Disaggregation:
New Arrangement: **Physical Caged** **Physical Cageless** **Virtual** **Other** **Augmented Arrangement:** **Physical Caged** **Physical Cageless** **Virtual** **Other**

Calculation:	**Report Structure/Geography:**
(Count of Collocation Arrangments completed within 90 calendar days)/Count of Collocation Arrangements Completed) x 100	State

Benchmark/Parity Performance Standard:
Benchmark: *100% in 90 days*

Exhibit B

Sprint Position Statement on Statistical Testing

Generally, non-parametric tests (e.g., Permutation Tests, Fisher's Exact Test, and the Binomial Test) are the preferred methods, given the typical non-normality of performance measurement data. However, such tests can be impractical due to being computationally intensive. Thus, non-parametric tests should be employed only for "small" samples. For "large" samples, parametric tests (e.g., z-tests) should be used (along with a skewness correction when appropriate).

The definition of "small" should be made in the context of the accuracy obtained using parametric statistical testing methodologies for "large" samples. In other words, the cutoff between "small" and "large" samples should be set such that sufficient accuracy is obtained when employing "large" sample testing methodologies. Sprint proposes no minimum sample size for statistical tests. In other words, Sprint proposes that statistical tests are applicable regardless of how small the sample size may be. Even though the reliability of the statistical tests can be compromised for very small sample sizes, Sprint sees no reasonable alternative to simply testing on any sample. Others may propose accumulating transactions until a minimum sample size is met; though the administrative difficulties of this are prohibitive. Some may even propose "throwing-out" data; though this would be problematic for any high-capacity services that tend to have small transaction counts (or order volumes).

Standards should be developed for the specific statistical tests to be used, as well as the conditions for when/how to use each type of test. However, since accuracy is dependent upon the nature of the data being tested, and each ILEC/carrier-customer could have relatively unique data, such standards should be viewed as preferred methodology unless evidence is produced that demonstrates a more accurate test (given the situational nature of the data being tested). Adopting a uniform methodology, without flexibility, could result in inaccurate test results (due simply to the uniqueness of data).

See table below for appropriate statistical tests to use, as a standard, with the recognition that more accurate tests may be employed if the data so warrant.

Sample Size	**Type of Measure**	**Preferred Statistical Tests (*without* cell-level comparisons)**	**Preferred Statistical Method (cell-level comparisons)**
"small"	mean	Permutation Testing	Permutation Testing (p-value converted to a z-score)
	proportion	Fisher's Exact Test (i.e., Hypergeometric)	Standard Z, with finite population correction
	rate	Binomial Test	Standard Z, with finite population correction
"large"	mean	Modified Z, with skewness correction (ILEC variance used, rather than pooled variance)	Modified Z, with skewness correction (ILEC variance used, rather than pooled variance)
	proportion	Standard Z, with finite population correction	Standard Z, with finite population correction
	rate	Standard Z, with finite population correction	Standard Z, with finite population correction

The benefit of standards for statistical methodologies would be to lessen the burden of having vastly different methodologies state-by-state. However, uniform statistical methodology would *not* assist in comparing performance across regions. Test statistics are highly sensitive to sample size. Thus, test statistics will vary due to sample size, even if performance remains constant. In other words, 100 transactions through a process will yield a different statistical result than 1,000 transactions through the exact same process, even when all transactions are "treated equally." Test statistics do not measure performance, nor do they provide a basis by which to compare performance from one region to the next (unless sample sizes are the same across regions). Comparison of performance across regions should be made by comparing performance measurement results directly, or by comparing metrics that are not so sensitive to sample size.

Statistical testing methodologies are the preferred method for evaluating parity service. However, since parity comparisons are not always available for certain key performance measures, benchmarks may be appropriate. When used, benchmarks should be set as tolerance limits and not as performance targets. In other words, the benchmark should take into consideration the potential for random variation in the process. Doing so obviates the need for statistical testing on benchmark measures.
For benchmark proportion measures, consideration should be made for the impact that small samples can have in necessitating better-than-compliant service in order to meet the benchmark. For example, if a benchmark is set at 95%, and there are only 19 transactions, missing one transaction would yield a performance result of 94.7%. Thus, such a situation requires 100% performance. Sprint proposes that a table be designed to designate "practical benchmark" performance for small samples associated with benchmark proportion measures. In this example, the practical benchmark might allow for one miss out of the nineteen transactions.

Sprint advocates the standard confidence level of 95% (i.e., Type I error rate of 5%) for all statistical tests. In setting the Type I error rate at 5%, each statistical test has a 5% chance of causing the ILEC to pay incentives even when processes are operating at parity. Thus, Sprint proposes a forgiveness provision to account for the monetary impact to the ILEC resulting from Type I errors. The forgiveness provision, in general, would forgive payment of incentives in such as way as to mitigate the risk of Type I errors.

Since the data being tested are observational data, and not data collected through an experimental design, the accuracy of any statistical test is highly dependent upon the assumption that comparisons are being made at "like-to-like" levels. For instance, a statistical test comparing the repair intervals of ILEC retail data to a particular carrier-customer may conclude disparity due simply to the fact that the ILEC's retail customers may be mostly in rural areas, while the carrier-customer's business is concentrated in urban areas. It cannot be assumed that the unavoidable difference in repair intervals between urban and rural areas are accounted for in the definition of disaggregation of a measurement for reporting purposes. In many instances, however, the disaggregation of a measurement will indeed provide reasonably like-to-like comparisons. Further, when it is found that a reported disaggregation of a measurement does not provide for a like-to-like comparison, it may prove to be impractical and unnecessary to expand the disaggregation to account for all like-to-like comparisons (for instance, if the repair intervals are being reported by service group types, and yet a like-to-like comparison must be made at individual wire centers, it is not necessary to report each service group type by dozens of individual wire centers). Instead of accounting for all levels of like-to-like comparisons in the reporting level (disaggregated

measurements), statistical comparisons can be made at like-to-like levels (called the "cell level"), and aggregated to a single test statistic at the reporting level.

When performing cell-level comparisons, Sprint proposes an aggregation technique (initially developed by Dr. Collin Mallows while working for AT&T) which will not only allow for more accurate tests at the reporting level, but which will also minimize the potential of good performance masking bad performance. See Attachment A for detailed statistical techniques.

When statistical tests are employed, Materiality Thresholds should be implemented, when appropriate, in recognition that statistical significance does not necessarily equate to business significance (see Attachment One).

When cell-level comparisons are made (i.e., statistical comparisons below the reporting level), a single aggregate test statistic, the "Truncated Z", is used for testing at the reporting level. See details in Attachment Two.

Exhibit B
Attachment One

Materiality Thresholds for Parity Measures

When evaluating compliance in providing carrier-customers with service that is in parity with service provided to retail customers, statistical tests can misidentify differences as significant. This weakness in the statistical tests is due simply to the fact that *statistical significance* is not necessarily synonymous with *business significance.*
The proposal ---

Certain parity measures (and/or submeasures) would have predetermined materiality thresholds. Setting these materiality thresholds would be accomplished through the same process of negotiation as are benchmark values. All statistical tests should be performed as proposed. However, when the statistical tests yield a non-compliant result, a check for materiality should be made at the submeasure level, for each carrier-customer. If the proposed materiality threshold is not crossed, despite the results of the statistical test, the result would be deemed compliant.

There are two types of materiality considerations that should be made --- one for measures typically associated with small samples and one for measures typically associated with large samples.

Small Samples for Parity Measures
For measures typically associated with small samples, the measure itself can be highly sensitive to small differences in service. Similar to the small sample adjustment used for benchmark proportion measures, small samples for parity measures (especially proportion and rate measures) can result in the need for perfect or near-perfect service in order to be deemed compliant. For example, the measure *Trouble Report Rate* is defined as the number of trouble tickets per month divided by the number of access lines the customer has. For the retail business as a whole (for a particular submeasure), there are typically 18 troubles per 36,814 access lines, for a trouble rate of 0.05%. For a particular carrier-customer with 173 access lines, a single trouble report would result in a 0.6% trouble rate. This would result in statistically significant non-compliance (z-score = -3.05). However, one trouble report for a month does not have a significant impact on the carrier-customer's ability to compete.

The proposal ---

To set the threshold of materiality for the *Trouble Report Rate* measure, the following adjustment table should be adopted:

Number of Access Lines (for a carrier-customer)	Permitted Troubles
1 to 24	1
25 to 74	2
75+	3

For the carrier-customer with 173 access lines and 1 trouble, accompanied by a statistically significant difference, a look-up in this table would indicate that more than 3 troubles would be required before a significant business impact would occur. As a note for how *not* to use this table, consider a carrier-customer with 4 troubles and better than parity service (i.e., the carrier-customer is receiving better service than the retail results). This table does not indicate that no more than 3 troubles are ever allowable. It is used only when there is a statistically significant difference identified.

Large Samples for Parity Measures

For measures typically associated with large samples, the measure is not sensitive to slight differences in service, but the resulting statistical test is. Billing measures, for example, tend to have large sample sizes. These large sample sizes make such measures sensitive to very small differences in service. For instance, suppose a retail result runs about 98.3%, based on 60,000 transactions, and a particular carrier-customer has a 97.9% result, based on 3,000 transactions. The difference in service (0.4%) is slight, but could result in a statistically significant difference. Even though the statistical test might identify a difference, it begs the question as to whether a 0.4% difference for this carrier-customer actually has any impact on that carrier-customer's ability to compete.

Exhibit B

Attachment Two

Statistical Calculations

Statistical functions Definitions:

$\Phi^{-1}(x)$ Inverse cumulative standard normal distribution function.

$pt(t,df)$ Cumulative distribution function of a t-statistic with df degrees of freedom.

$BN(x,n,p)$ Binomial distribution density function. The probability of observing x of n successes with a probability p of success.

CBN(x,n,p) Cumulative binomial distribution function.

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

$HG(q,m,n,k)$ Hypergeometric distribution density function where q represents the number of red balls out of a sample of size k drawn from an urn containing m red balls and n black ones.

CHG(q,m,n,k) Cumulative hypergeometric distribution.

$$CHG(q,m,n,k) = P(H \le q) = \begin{cases} 0(q < \max(0,k-m)) \\ \sum_{h=\max(0,k-m)}^{q} HG(h)(\max(0,k-m) \le q \le \min(k,m)) \\ 1(q > \min(k,m)) \end{cases}$$

$rank(x)$ Ranks the input variables. In case of ties, the average rank is calculated.

$choose(n,k)$ Calculates the binomial coefficients.

Global variable definitions:

L	=	The total number of occupied cells.[1]
j	=	An index counter indicating cell number.
n_{1j}	=	The number of ILEC transactions in cell j.
n_{2j}	=	The number of carrier-customer transactions in cell j.
n_j	=	The total number of transactions in cell j.
X_{1jk}	=	Individual ILEC transactions in cell j.
X_{2jk}	=	Individual carrier-customer transactions in cell j.
Φ^{-1}	=	Inverse cumulative standard normal distribution function.

Mean Performance Measures[2]

Variable definitions:

STATISTIC	*DEFINITION*	*EXPLANATION*
$\bar{X}_{1j} = \frac{1}{n_{1j}} \sum_{k=1}^{n_{1j}} X_{1jk}$	ILEC sample mean of cell j.	Add observations and divide by the number of observations.
$\bar{X}_{2j} = \frac{1}{n_{2j}} \sum_{k=1}^{n_{2j}} X_{2jk}$	Carrier-customer sample mean of cell j.	Add observations and divide by the number of observations.
$s_{1j}^2 = \frac{1}{n_{1j}-1} \sum_{k=1}^{n_{1j}} (X_{1jk} - \bar{X}_{1j})^2$	ILEC sample variance in cell j. May be NA for very small sample sizes.	Subtract each observation by its mean, square the difference, add them all up, and divide by the number of observations minus 1.
$s_{2j}^2 = \frac{1}{n_{2j}-1} \sum_{k=1}^{n_{2j}} (X_{2jk} - \bar{X}_{2j})^2$	Carrier-customer sample variance in cell j. May be NA for very small sample sizes.	Subtract each observation by its mean, square the difference, add them all up, and divide by the number of observations minus 1.

[1] If comparisons are performed at the submeasure level, L = 1 and only one cell (the submeasure) exists. If comparisons are performed at the cell level, L may exceed 1 and more than one cell may exist (see Attachment G for the list of (sub)measurements approved for comparison at the cell level).

[2] Only perform STEP 4 and STEP 5 if L > 1 (e.g., if this is a cell-level comparison, and there is more than one cell with CLEC activity, then perform STEP 4 and STEP 5).

$\gamma_{1j} = \frac{\frac{1}{n_{1j}}\sum_{k=1}^{n_{1j}}\left(X_{1jk} - \bar{X}_{1j}\right)^3}{\left[\frac{1}{n_{1j}}\sum_{k=1}^{n_{1j}}\left(X_{1jk} - \bar{X}_{1j}\right)^2\right]^{3/2}}$	The ILEC sample skewness in cell j. May be NA for very small sample sizes.	Subtract each observation by its mean, cube the difference, add them all up, and divide by the number of observations. Then divide that number by the cubed square root of the population variance.
$\gamma_{2j} = \frac{\frac{1}{n_{2j}}\sum_{k=1}^{n_{2j}}\left(X_{2jk} - \bar{X}_{2j}\right)^3}{\left[\frac{1}{n_{2j}}\sum_{k=1}^{n_{2j}}\left(X_{2jk} - \bar{X}_{2j}\right)^2\right]^{3/2}}$	The carrier-customer sample skewness in cell j. May be NA for very small sample sizes.	Subtract each observation by its mean, cube the difference, add them all up, and divide by the number of observations. Then divide that number by the cubed square root of the population variance.
XY_j	Combined ILEC and carrier-customer samples.	Concatenate the ILEC and carrier-customer samples into a single variable.

STEP 1: Calculate Cell Weights

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

For each cell, multiply the ILEC sample size and the carrier-customer sample size, divide by their sum, and take a square root.

If all ILEC and carrier-customer transactions within a cell have identical performance measures (e.g., service durations), set $W_j = 0$.

STEP 2: Calculate a Z-statistic for each cell

a. If $W_j = 0$, then set $Z_j = 0$.

b. If $\min(n_{1j}, n_{2j}) > 6$ and $s_{1j}^2 > 0$

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

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 γ_{1j} over all cells within the submeasure (reporting level) such that

i) $\gamma_{1j} > 0$

ii) $n_{1j} > 6$, and

iii) $n_{1j} > n_{3q}$, where n_{3q} is the 3 quartile of all n_{1j}.in cells where (i) and (ii) are true.

If no cells within a submeasure exist that satisfy conditions (i) - (iii), then set g = 0.

Calculate the p-value from the T_j statistic with $n_{1j} - 1$ degrees of freedom using $P_j = pt(T_j, n_{1j} - 1)$.
Calculate the z-score Z_j from this p-value as $Z_j = \Phi^{-1}(P_j)$.

c. If $[\min(n_{1j}, n_{2j}) \le 6$ OR $s_{1j}^2 = 0]$ AND $W_j > 0$ (from part 1):

1) Calculate the number of possible permutations
Nperms = $choose(n_j, n_{1j})$

2) If $n_{1j} = n_{2j} = 1$, then $Z_j = \begin{cases} 0.6744898 & X_{1j} > X_{2j} \\ 0 & X_{1j} = X_{2j} \\ -0.6744898 & X_{1j} < X_{2j} \end{cases}$

3) If only $n_{1j} = 1$ then let R_0 equal the rank of the ILEC observation in the combined sample XY_j. Calculate $Z_j = \Phi^{-1}\left(\frac{R_0 - 0.5}{n_j}\right)$.

4) If only $n_{2j} = 1$ then let R_0 equal the rank of the carrier-customer observation in the combined sample XY_j. Calculate $Z_j = -\Phi^{-1}\left(\frac{R_0 - 0.5}{n_j}\right)$.

5) If $\min(n_{1j}, n_{2j}) \ge 2$ and $Nperms \le 1000$ then

i) Generate all possible permutations of sizes n_{1j} and n_{2j} from the combined sample XY_j.

ii) For each permuted sample, calculate the sum of sample of size n_{1j}.

iii) Let R_0 equal the rank of the observed sum within all of the permuted sums.

Calculate $Z_j = \Phi^{-1}\left(\frac{R_0 - 0.5}{Nperms}\right)$.

6) If $\min(n_{1j}, n_{2j}) \geq 2$ and $Nperms > 1000$ then

i) Generate 1,000 random permutations of sizes n_{1j} and n_{2j} from the combined sample XY_j.

ii) For each permuted sample, calculate the sum of the sample of size n_{1j}.

iii) Let R_0 equal the rank of the observed sum within the 1000 permuted sums and calculate $Z_j = \Phi^{-1}\left(\frac{R_0 - 0.5}{1001}\right)$.

STEP 3: Truncate Z-statistic for each cell

For each cell, $Z_j^* = \begin{cases} Z_j & L = 1 \\ \min(0, Z_j) & \text{otherwise} \end{cases}$.

Note that there is no truncation step if there is only one cell in the submeasure calculation.

STEP 4: Calculate the theoretical mean and variance of the truncated statistic under parity.

1. If for cell j, $W_j = 0$, set $ExpectedMean_j^{parity}$, $ExpectedVariance_j^{parity}$, and $ExpectedSkew_j^{parity}$ all equal to 0.
2. If $\min(n_{1j}, n_{2j}) > 6$ and $s_{1j}^2 > 0$
   a. $ExpectedMean_j^{parity} = -\frac{1}{\sqrt{2\pi}}$.
   b. $ExpectedVariance_j^{parity} = \frac{1}{2} - \frac{1}{2\pi}$
   c. $ExpectedSkew_j^{parity} = -\left(\frac{1}{2\sqrt{2\pi}} + \frac{2}{(2\pi)^{\frac{3}{2}}}\right)$
3. If $\min(n_{1j}, n_{2j}) \leq 6$ OR $s_{1j}^2 = 0$
   a. Let $N_j = \min(Nperms, 1000)$
   b. For $i = 1, \ldots, N_j; z_{ji} = \min\left\{0, \Phi^{-1}\left(\frac{i - 0.5}{N_j}\right)\right\}$.
   c. $\Theta_{ji} = \frac{1}{N_j}$
   d. $ExpectedMean_j^{parity} = \sum_{i=1}^{N_j} \Theta_{ji} z_{ji}$

e. $$ExpectedVariance_j^{parity} = \sum_{i=1}^{N_j} \Theta_{ji} z_{ji}^2 - (ExpectedMean_j^{parity})^2$$

f. $$ExpectedSkew_j^{parity} = \sum_i \Theta_{ji} z_{ji}^3 - 3ExpectedMean_j^{parity} \times ExpectedVariance_j^{parity} - \left[ExpectedMean_j^{parity}\right]^3$$

STEP 5: Calculate the initial aggregate test statistic.

$$Z_0^T = \begin{cases} Z_1 & L = 1 \\ Z^T = \dfrac{\sum_j W_j (Z_j^* - ExpectedMean_j^{parity})}{\sqrt{\sum_j W_j^2 \times ExpectedVariance_j^{parity}}} & otherwise \end{cases}$$

STEP 6: Calculate the final aggregate test statistic.

1. If L = 1, we use the cell modified Z statistic. $Z^T = Z_0^T = Z_1$.

2. If L > 1, do the following.
   a. Calculate the aggregate skewness coefficient.

$$g_{agg} = \frac{\sum_j W_j^3 \times ExpectedSkew_j^{parity}}{6 \times \left(\sum_j W_j^2 \times ExpectedVariance_j^{parity} \right)^{\frac{3}{2}}}$$

   b. If $Z_0^T > -\dfrac{1+4g_{agg}^2}{4g_{agg}}$ or $-10^{-6} < g_{agg} < 0$ then $Z^T = Z_0^T$.

   c. Otherwise

$$Z^T = \frac{-1 + \sqrt{1 + 4g_{agg}^2 + 4g_{agg} Z_0^T}}{2g_{agg}}$$

Proportion Performance Measures[3]

Variable definitions:

a_{1j} = Number of ILEC cases possessing an attribute of interest in cell j.

a_{2j} = Number of carrier-customer cases possessing an attribute of interest in cell j.

a_j = Number of cases possessing an attribute of interest in cell j.

NOTE: All measurements made using the number of *misses* (or negative measurement value).

STEP 1: Calculate Cell Weights.

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

For each cell, multiply the ILEC sample size and the carrier-customer sample size, the proportion of affected transactions and the proportion of non-affected transactions, divide by the total number of transactions, and take a square root.

STEP 2: Calculate a Z-statistic for each cell.

If $W_j = 0$ then set $Z_j = 0$.

Else, calculate the Z-statistic as $Z_j = \dfrac{n_j a_{1j} - n_{1j} a_j}{\sqrt{\dfrac{n_{1j}n_{2j}a_j(n_j - a_j)}{n_j - 1}}}$

STEP 3: Truncate Z-statistic for each cell.

$$\text{For each cell, } Z_j^* = \begin{cases} Z_j & L = 1 \\ \min(0, Z_j) & \text{otherwise} \end{cases}$$

Note that there is no truncation step if there is only one cell in the submeasure calculation.

STEP 4: Calculate the theoretical mean and variance of the truncated statistic under parity.

1. If for cell j, $W_j = 0$, set $ExpectedMean_j^{parity}$, $ExpectedVariance_j^{parity}$, and $ExpectedSkew_j^{parity}$ all equal to 0.

[3] Only perform STEP 4 if L > 1 (e.g., if this is a cell-level comparison, and there is more than one cell with CLEC activity, then perform STEP 4).

2. If $\min\left\{a_{1j}\left(1-\frac{a_{1j}}{n_{1j}}\right), a_{2j}\left(1-\frac{a_{2j}}{n_{2j}}\right)\right\} > 9$.

   a. $ExpectedMean_j^{parity} = -\frac{1}{\sqrt{2\pi}}$.

   b. $ExpectedVariance_j^{parity} = \frac{1}{2} - \frac{1}{2\pi}$.

   c. $ExpectedSkew_j^{parity} = -\left(\frac{1}{2\sqrt{2\pi}} + \frac{2}{(2\pi)^{\frac{3}{2}}}\right)$

3. Else, if $\min\left\{a_{1j}\left(1-\frac{a_{1j}}{n_{1j}}\right), a_{2j}\left(1-\frac{a_{2j}}{n_{2j}}\right)\right\} \le 9$.

   a. Let $i = \max(0, a_j - n_{2j}), \ldots, \min(a_j, n_{1j})$.

   b. Calculate $z_{ji} = \min\left\{0, \frac{n_j i - n_{1j} a_j}{\sqrt{\frac{n_{1j} n_{2j} a_j (n_j - a_j)}{n_j - 1}}}\right\}$ for each value of i.

   c. For each value of i, calculate $\Theta_{ji} = HG(i, n_{1j}, n_{2j}, a_j)$.

   d. $ExpectedMean_j^{parity} = \sum_{i=1}^{N_j} \Theta_{ji} z_{ji}$.

   e. $ExpectedVariance_j^{parity} = \sum_{i=1}^{N_j} \Theta_{ji} z_{ji}^2 - (ExpectedMean_j^{parity})^2$.

   f. $ExpectedSkew_j^{parity} =$

$$\sum_i \Theta_{ji} z_{ji}^3 - 3ExpectedMean_j^{parity} \times ExpectedVariance_j^{parity} - \left[ExpectedMean_j^{parity}\right]^3$$

STEP 5: Calculate the initial aggregate test statistic.

1. If L = 1 and $\min\left\{\left\{a_{1j}\left(1-\frac{a_{1j}}{n_{1j}}\right), a_{2j}\left(1-\frac{a_{2j}}{n_{2j}}\right)\right\} \le 9\right.$,

   $Z_0^T = \Phi^{-1}(\alpha)$

   where $\alpha = CHG(a_{1j}, n_{1j}, n_{2j}, a_j)$.

2. If L > 1 or $\min\left\{a_{1j}\left(1-\frac{a_{1j}}{n_{1j}}\right), a_{2j}\left(1-\frac{a_{2j}}{n_{2j}}\right)\right\} > 9$,

$$Z_0^T = \begin{cases} Z_1 & L = 1 \\ Z^T = \dfrac{\sum_j W_j (Z_j^* - ExpectedMean_j^{parity})}{\sqrt{\sum_j W_j^2 \times ExpectedVariance_j^{parity}}} & otherwise \end{cases}$$

STEP 6: Calculate the final aggregate test statistic.

1. If L = 1, we use the cell modified Z statistic. $Z^T = Z_0^T$.

2. If L > 1, do the following.

   a. Calculate the aggregate skewness coefficient.

$$g_{agg} = \frac{\sum_j W_j^3 \times ExpectedSkew_j^{parity}}{6 \times \left(\sum_j W_j^2 \times ExpectedVariance_j^{parity} \right)^{\frac{3}{2}}}$$

   b. If $Z_0^T > -\dfrac{1+4g_{agg}^2}{4g_{agg}}$ or $-10^{-6} < g_{agg} < 0$ then $Z^T = Z_0^T$.

   c. Otherwise

$$Z^T = \frac{-1 + \sqrt{1 + 4g_{agg}^2 + 4g_{agg} Z_0^T}}{2g_{agg}}$$

Rate Performance Measures[4]

Variable definitions:

b_{1j}	=	Number of ILEC base elements in cell j.
b_{2j}	=	Number of carrier-customer base elements in cell j.
b_j	=	Total number of base elements cell j.
$r_{1j} = n_{1j} / b_{1j}$	=	ILEC sample rate of cell j.
$r_{2j} = n_{2j} / b_{2}$	=	Carrier-customer sample rate of call j.
$q_j = b_{1j} / b_j$	=	Relative proportion of ILEC elements for cell j.

STEP 1: Calculate Cell Weights.

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

For each cell, multiply the number of ILEC base elements, the number of carrier-customer base elements and the number of transactions, divide by the total number of base elements squared, and take a square root.

STEP 2: Calculate a Z-statistic for each cell.

If $W_j = 0$ then set $Z_j = 0$.

Else, calculate the Z-statistic as $Z_j = \frac{n_{1j} - n_j q_j}{\sqrt{n_j q_j (1 - q_j)}}$

STEP 3: Truncate Z-statistic for each cell.

For each cell, $Z_j^* = \begin{cases} Z_j & L = 1 \\ \min(0, Z_j) & \text{otherwise} \end{cases}$

Note that there is no truncation step if there is only one cell in the submeasure calculation.

STEP 4: Calculate the theoretical mean and variance of the truncated statistic under parity.

[4] Only perform STEP 4 if L > 1 (e.g., if this is a cell-level comparison, and there is more than one cell with CLEC activity, then perform STEP 4).

1. If for cell j, $W_j = 0$, set $ExpectedMean_j^{parity}$, $ExpectedVariance_j^{parity}$, and $ExpectedSkew_j^{parity}$ all equal to 0.

2. If $\min(n_{1j}, n_{2j}) > 15$ *and* $n_j q_j (1-q_j) > 9$

   a. $ExpectedMean_j^{parity} = -\frac{1}{\sqrt{2\pi}}$.

   b. $ExpectedVariance_j^{parity} = \frac{1}{2} - \frac{1}{2\pi}$

   c. $ExpectedSkew_j^{parity} = -\left(\frac{1}{2\sqrt{2\pi}} + \frac{2}{(2\pi)^{\frac{3}{2}}} \right)$

3. If $\min(n_{1j}, n_{2j}) \le 15$ *or* $n_j q_j (1-q_j) \le 9$

   a. Let $i = 0, \ldots, n_j$.

   b. Calculate $z_{ji} = \min\left\{0, \frac{i - n_j q_j}{\sqrt{n_j q_j (1-q_j)}}\right\}$ for each value of i.

   c. For each value of i, calculate $\Theta_{ji} = BN(i, n_j, q_j)$.

   d. $ExpectedMean_j^{parity} = \sum_{i=1}^{N_j} \Theta_{ji} z_{ji}$.

   e. $ExpectedVariance_j^{parity} = \sum_{i=1}^{N_j} \Theta_{ji} z_{ji}^2 - (ExpectedMean_j^{parity})^2$.

   f. $ExpectedSkew_j^{parity} =$

$$\sum_i \Theta_{ji} z_{ji}^3 - 3ExpectedMean_j^{parity} \times ExpectedVariance_j^{parity} - \left[ExpectedMean_j^{parity} \right]^3$$

STEP 5: Calculate the initial aggregate test statistic.

1. If L = 1 and (or $n_j q_j (1-q_j) \le 9$),

   $Z_0^T = \Phi^{-1}(\alpha)$

   where $\alpha = CBN(n_{1j}, n_j, q_j)$.

2. If L > 1 or $\min(n_{1j}, n_{2j}) > 15$ *or* $n_j q_j (1-q_j) > 9$,

$$Z_0^T = \begin{cases} Z_1 & L = 1 \\ Z^T = \dfrac{\sum_j W_j (Z_j^* - ExpectedMean_j^{parity})}{\sqrt{\sum_j W_j^2 \times ExpectedVariance_j^{parity}}} & otherwise \end{cases}$$

STEP 6: Calculate the final aggregate test statistic.

1. If L = 1, we use the cell modified Z statistic. $Z^T = Z_0^T$.

2. If L > 1, do the following.
   a. Calculate the aggregate skewness coefficient.

$$g_{agg} = \frac{\sum_j W_j^3 \times ExpectedSkew_j^{parity}}{6 \times \left(\sum_j W_j^2 \times ExpectedVariance_j^{parity} \right)^{\frac{3}{2}}}$$

   b. If $Z_0^T > -\dfrac{1+4g_{agg}^2}{4g_{agg}}$ or $-10^{-6} < g_{agg} < 0$ then $Z^T = Z_0^T$.

   c. Otherwise

$$Z^T = \frac{-1 + \sqrt{1 + 4g_{agg}^2 + 4g_{agg} Z_0^T}}{2g_{agg}}$$