COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION
AT RICHMOND

COMMONWEALTH OF VIRGINIA, ex rel.	)	
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STATE CORPORATION COMMISSION	)	
	)	CASE NO. PUC000026
Ex Parte: Establishment of a	)	
Collaborative Committee to	)	
Investigate Market Opening Measures	)	

Comments of
AT&T Communications of Virginia, Inc.
On Self-Executing Remedies Plans

There can no longer be any dispute that the adoption of a self-executing performance remedies plan is in the best interests of Virginia consumers and the development of local exchange competition in Virginia. Without meaningful remedies, the most stringent performance metrics and standards lack teeth and could be ignored by Verizon without consequence. The remedies plan proposed by Verizon falls short, however, because it fails to provide adequate incentives for Verizon to provide CLECs non-discriminatory wholesale services, as AT&T will show below. Accordingly, AT&T proposes a Performance Incentive Plan for Verizon Virginia, Inc. that cures the deficiencies of the plan proposed by Verizon. AT&T's plan is attached to these Comments.[1]

[1] AT&T's plan covers Verizon Virginia only, because the Collaborative Committeee has not even begun to consider performance metrics and standards for Verizon South, which are critical to any remedies proposal for that entity. Verizon's plan purports to be for both Verizon Virginia and Verizon South. It is, however, premature to consider a remedies plan for Verizon South.

I. A REMEDIES PLAN MUST PROVIDE TIMELY AND ADEQUATE REMEDY PAYMENTS TO ENCOURAGE NON-DISCRIMINATORY WHOLESALE SERVICE.

In formulating and implementing appropriate self-executing remedies, certain principles should be followed by the Virginia Commission. Most importantly, the remedy must create the proper incentives to reflect the unique and unusual relationship between Verizon and the CLECs. Unlike the typical contractual relationship, Verizon is required by the Telecommunications Act of 1996 ("Act") to be a supplier to its most immediate competitors. It thus has no economic incentive to provide quality service to its competitors and every incentive not to.

And, unlike a typical contractual relationship, the CLECs have no effective alternative supplier to replace Verizon. If Verizon provides poor quality wholesale service, so that provisioning or repair dates are missed, service outages are frequent or loop provisioning inept, it will be the CLEC -- the retail carrier dealing with the customer -- that will suffer the consequences.

Verizon, like any profit-maximizing firm, can be expected to consider its own interests first, which will encourage it to devote fewer and lesser quality resources to serving its CLEC customers. Verizon will be rewarded rather than properly incented if remedies are weak, incomplete and untimely, because CLEC competition will be less effectual, thereby allowing Verizon to retain its market power and overwhelming market share.

This situation is worsened because the competitors have limited, if any, options for obtaining service elsewhere. For instance, network elements critical to provide service – including the local loop -- cannot be purchased from another

source. Accordingly, for some time to come Verizon will control the lifeblood of the CLECs' broad-scale local services business -- particularly for residential customers -- thus directly affecting their ability to satisfy their customers and to effectively compete. Unlike a competitive market, the CLECs are not in a position to simply terminate their contract with Verizon for breach, bring suit, wait for a judgment and find another comparable supplier to serve their immediate needs and those of their customers. There are no comparable broad scale suppliers at this time. The Commission, therefore, should adopt strong incentives to deter and remedy poor performance by Verizon. There is no acceptable alternative where the supplier is a competitor.

The monetary remedies must be meaningful in a business sense. For any remedy, the ILEC will weigh the cost of compliance with wholesale service quality measurements (including loss of market share and revenues) against the cost of non-compliance, including the value of retaining market share and revenues. Obviously, if the cost of non-compliance is lower than the cost of compliance, then a perverse incentive exists. Any remedies payment must be sufficiently high so it is not viewed as a cost of business that the ILEC feels comfortable paying to prevent or delay competitors from making inroads into the local exchange and access market. The goal is to have self-executing remedies that provide the requisite inducement to the ILEC business managers in charge of providing service to CLECs to meet the standards.

Moreover, the remedies must be timely. In other words, they must take effect as soon as practicable after the defined performance failure has occurred. For

instance, if Verizon fails to satisfy the established service quality measures for provisioning UNE loops, then the remedy for this violation must be available immediately, that is, upon receipt of the timely report. The longer the remedy is delayed, the less the remedy serves its purpose.

II. AT&T'S PERFORMANCE INCENTIVE PLAN PROVIDES THE PROPER REMEDIES TO ASSURE THAT CLECS WILL OBTAIN NON-DISCRIMINATORY WHOLESALE SERVICES IN VIRGINIA.

AT&T proposes a plan that is straight-forward, fair and provides adequate incentives to assure non-discriminatory behavior by Verizon. The plan is described in greater detail in the attachment to these Comments. In summary, AT&T's plan consists of essentially two types, or "tiers," of self-executing remedies as well as remedies for inadequate reporting of metrics, with respect to Verizon's obligations to satisfy the performance standards to be adopted by the Commission and to meet the Act's non-discrimination requirements:

1. **Tier I**: Liquidated damages payable to CLECs for a failure to meet specified service standards affecting the CLEC; and

2. **Tier II**: Damages payable to an industry fund for failure to meet specified service standards on an aggregate basis (that is, when the CLEC industry as a whole is treated discriminatorily).

These remedies would take effect upon the Commission's adoption of the Performance Incentive Plan and would escalate, as a failure to meet performance standards becomes more severe, to reflect the increasingly greater damages that AT&T and other CLECs are likely to suffer, and to incent Verizon to devote sufficient resources to avoid repeated failures to meet these standards.

The remedies proposed by AT&T reflect the concept of liquidated damages, which are specified dollar amounts that parties to a contract have agreed to in advance in the event of a breach of the contract. Parties to private contracts frequently agree to such stipulated damages where one party clearly will suffer damages from a breach of contract, but the amount of the party's damages will be difficult to calculate. The "liquidated" or stipulated damage amount represents a reasonable, albeit inexact, estimate of the amount of actual loss. Liquidated damages provide the injured party with a swift and certain remedy and limit the risk of both parties. As new entrants, CLEC damages for breach of performance standards will necessarily be difficult to measure, and any delay entailed in proving damages would allow the Verizon to violate the service standards with impunity for extended periods of time before a meaningful remedy is obtained.

The Tier I remedies would automatically apply when Verizon fails to meet a specific service measurement. All appropriate performance standards are included in AT&T's plan. The determination of whether Verizon has failed to provide the requisite parity is determined by a statistical calculation that is based upon balancing the probability that Verizon's performance is incorrectly classified as "failing" with the probability that Verizon's performance is incorrectly classified as "passing." For each failure, Verizon would pay damages ranging from $2,500 to $25,000, depending on the severity of the harm, to the injured CLEC.

The Tier II remedies are imposed when Verizon has failed to meet the service standards for the CLEC industry in the aggregate. In this case, additional remedies are justified because Verizon's poor performance is so pervasive that it has the effect of suppressing competition in Virginia. The payments would be made

into an industry fund, from which Verizon could not derive any benefit. Tier II remedy payments do not substitute for Tier I remedies but are in addition thereto.

III. VERIZON'S PERFORMANCE PLAN FALLS SHORT OF PROVIDING THE REQUISITE INCENTIVES FOR NON-DISCRIMINATORY PERFORMANCE.

Although metrics and standards are critical in any evaluation of a remedies plan, AT&T does not address the performance standards contained in Appendix A to Verizon's proposed plan, because the metrics and standards that will be recommended by the Collaborative Committee and adopted by the Commission are in a state of flux. When Verizon submitted its remedies plan in August 2000, the operative metrics and standards were the one adopted by Project Leader Skirpan in the third party test of Verizon's OSS, Case No. PUC000035. Verizon has also proposed other iterations of metrics and standards, which have not been adopted. Today, the Collaborative Committee is considering an AT&T and WorldCom proposal to use the metrics and standards used in New York, as they may be amended from time to time. Verizon has submitted a new set of metrics and standards for Virginia that are adaptations of the New York model. These metrics and standards are currently being scrutinized by the subject matter experts of Verizon and interested CLECs. Accordingly, the standards that Verizon used in support of its proposed performance plan are, or soon will be, obsolete. AT&T's Comments are therefore limited to the other aspects of Verizon's proposed performance plan.

1. The $31.1 Million Cap On Verizon's Potential Liability Is Far Too Low To Incent Non-Discriminatory Performance.

Verizon requests that the Commission institute an absolute cap on the amount of liability it will incur if its wholesale services fail to pass muster. To make matters worse, the cap proposed by Verizon is so low as to make the payment of remedies little more than the cost of doing business for Verizon, and a trivial cost at that.

To put this in perspective, the New York Performance Assurance Plan ("PAP") alone places $293 million "at risk" (plus any remedies provided for in interconnection agreements). Yet, it still took over six months and action by the NYPSC and the FCC imposing substantial additional penalties not provided for in the original PAP ($13 million) to get Verizon New York to fix discriminatory performance that adversely affected tens of thousands of customers.

In Virginia, Verizon would have the Commission believe that placing a bit more than one-tenth of that amount "at risk," *i.e*., $31.1 million for Verizon Virginia, will incent it provide nondiscriminatory performance. That is not likely to happen. Experience has proved that substantial and immediate penalties are the only way to make Verizon fix problems that harm CLECs.

Verizon's proposed $31.1 million cap is out of line with what it has agreed to in other states. In New York, the $293 million cap for 12 million access lines amounts to approximately $22.42 per access line and Verizon is liable for millions more pursuant to interconnection agreements. In Massachusetts, Verizon accepted a $155 million cap for 4.5 million access lines, amounting to approximately $34.44 per access line, which does not exclude higher interconnection agreement

remedies instead. In sharp contrast, Verizon Virginia proposes a cap that amounts to approximately $8.18 per access line, and asks that this be its total exposure for harming competition.[2]

The only purpose served by an absolute cap is to present a disincentive for Verizon to provide nondiscriminatory service. A cap simply allows Verizon to calculate precisely how much it would have to pay to continue its monopoly. Moreover, a lesser level of remedies in Virginia than in the other Verizon states will only incent Verizon to focus its efforts on those other states, at the expense of Virginia and Virginia's consumers.

2. Verizon's Plan Impermissibly Nets Out Remedy Payments Due Under Interconnection Agreements.

Verizon proposes that the amount of any remedy payments under an interconnection agreement "will be credited against and reduce any amount due to the CLEC under the Virginia Plan."[3] This is out of line with the performance remedies plans applied to Verizon in New York and Massachusetts.

The approval of the New York Plan by the NYPSC, and the FCC's acceptance, was predicated on the express understanding that the New York PAP, by itself, is not sufficient to deter backsliding. The FCC's endorsement, in particular, was based on the understanding that prevention of backsliding in New York rested on three separate deterrents: (1) remedies under the PAP, (2) remedies under the various interconnection agreements to which Verizon New York is a party, and (3) the ability of the New York Commission and/or the FCC to act on, and impose *additional*

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[2] $31.1M/3.8M switched access lines, ARMIS 43-08 Report for Year 2000.

sanctions on Verizon for complaints brought to it by CLECs or for reasons determined by the PSC on its own motion.[4]

Verizon's plan also does not correspond to the remedies proposal recently made by its sister company in Massachusetts. In Massachusetts, VZ-MA accepted a performance assurance plan that assertedly was based on the New York PAP. The financial cap in Massachusetts amounts to $155 million for 4.5 million access lines, and does not exclude interconnection agreement remedies.[5]

3. Verizon's Plan Fails To Account For Statistical Events That Would Favor Verizon At The Expense Of CLECs.

Verizon's proposed plan imposes financial consequences for discriminatory conduct only if its disparate treatment of CLECs is so severe that it is statistically significant at the 95% confidence level. By establishing a confidence level of 95%, Verizon has minimized Type I error, *i.e*., erroneously concluding that the data reflect discriminatory treatment when in fact it is a random result of non-discriminatory treatment. Verizon, therefore, has minimized the possibility of an error being made against it. However, as AT&T explained in the AT&T Performance Incentive Plan (at 8-9), the higher the confidence level, the greater likelihood of a Type II error, *i.e*., concluding erroneously that there is no discriminatory treatment when in fact there is. Not surprisingly, Verizon's proposed plan makes no attempt to balance these

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[3] Verizon Performance Plan at 8-9.

[4] *See generally* Pre-filing Statement of Bell Atlantic- New York in NYPSC Case 97-C-0271, April 6, 1998.; *See also* New York PAP at 1, n. 1 and n.2; Order Directing Market Adjustments and Amending Performance Assurance Plan, NYPSC 00-C-0008, March 23, 2000 at 2, 5. (NYPSC ordered BA-NY to pay a $10 million fine above and beyond the PAP).

two error probabilities. While Type I error probability is reduced to 5%, Type II error probability is allowed to vary uncontrolled. This means that Verizon may well provide poor service but pay no remedies.

Verizon's failure to balance Type I and Type II error is a serious defect in its plan, that is cured by AT&T's Plan. A standard of 95% statistical confidence may be appropriate in certain situations where data can be collected to control both Type I and Type II error, *e.g*., reaching a conclusion that a drug with serious side-effects is effective in treating a particular disease, but not here. A 95% confidence interval in the present case is not appropriate because in measuring ILEC performance only as many data points are obtained as the often unpredictable market produces. The data is "uncontrolled," therefore the use of a fixed confidence test is inappropriate. The confidence of the test should be allowed to vary with the quantity of data available – lower when the quantity of data is small, and higher when the quantity of data is large.

Verizon's 95% certainty threshold required for imposing sanctions increases the probability of Verizon avoiding financial consequences for discriminatory conduct. More importantly, unlike in the case of drugs with potentially life threatening side effects, there are monetary ways to mitigate the possibility that penalties may be imposed on Verizon for behavior that is not in fact discriminatory.

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[5] The Massachusetts plan allows a CLEC to choose the higher of the plan remedy or an interconnection agreement remedy.

Verizon compounds the imbalance by using its so-called K Factor offset in mitigation of the 5% Type I error probability.[6] This additional fudge factor gives Verizon a free ride for an additional number of allowable performance failures each month. Moreover Verizon over-reaches, because in each instance the K Factor offset table in Appendix D of Verizon's plan provides that the number of measures that are to be ignored exceed 5%. While Verizon goes to great lengths to protect itself, it has made no provision in its plan to account for those random statistical events that would favor Verizon at the expense of CLECs.

A fixed critical value favors the ILEC by controlling only Type I error and leaving Type II error to vary (considerably) by sample size. Verizon sets the critical value at –1.65, which AT&T opposes. If a fixed critical value were to be adopted, it should be –1.04. AT&T's plan, on the other hand, balances these error probabilities, enables the use of a simple and direct measure of severity, and obviates the need for mitigation such as the complicated, logically inconsistent and difficult to implement K Factor offset table that Verizon proposes.[7]

Comparing relatively small data sets (as would be likely for a CLEC) to a much larger data set (as would likely exist for Verizon) demonstrates that the balancing of Type I and Type II error can reasonably be expected to occur in the range of 25% for samples with fewer than 100 data points but at about 5% for samples with 1000 data points.[8] The statistical methodology developed by AT&T and Ernst & Young in

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6 Verizon Performance Plan at 8 and Appendix D.

7 See, AT&T Performance Incentive Plan at 8-9 and Attachment E.

8 See Response to Question 3 contained in AT&T Ex Parte filed in CC Docket 98-56 dated July 13, 1999.

Louisiana is an appropriate method for calculating the critical values, which depend on the sample size, and balances Type I and Type II error probabilities for each given submeasure.[9] In its Performance Incentive Plan, AT&T proposes a value of 0.25 for the materiality parameter δ of the statistical methodology and appropriately corresponding values for ε and ψ.[10] By adopting this statistical methodology, the Commission will not tilt the scales entirely in Verizon's favor. Rather, it will introduce a key element of fairness that is lacking in the Verizon methodology.

4. The Remedy Payments Are Unduly Delayed.

Verizon has proposed to pay any penalties it incurs under its plan through a system of delayed billing credits rather than through direct payments to the harmed CLECs. Common sense demonstrates that bill credits are not the most effective means of providing an incentive for non-discriminatory service. The provision of bill credits instead of cash payments sets up a time divide between the time of the poor performance and the time of the payment of penalties for that performance. This divide diminishes the incentive value of the payments. It also reduces the visibility and deterent effect of the remedy, because a Verizon manager does not have to cut a check every month.

Under Verizon's plan, initial bill credits would not be paid for three months after the discriminatory service was rendered.[11] There is potential for further delay because

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

10 See the attached AT&T Performance Incentive Plan for a further discussion of this point.

11 Verizon Performance Plan at 2.

if a CLEC's bill for a month is less than the amount of the credit then, under Verizon's plan, the excess credit is carried over into future months instead of being immediately provided to the CLEC in the form of a cash payment.[12]

These delays could have a serious impact on smaller CLECs who may have cash flow problems due to poor Verizon performance. The reality of the situation is that if Verizon provides discriminatory service that harms a CLEC's customer, the CLEC must immediately provide a credit to that customer. If the CLEC then does not receive a credit from Verizon for up to three months, the CLEC is faced with a cash flow problem.[13] To provide a meaningful incentive to Verizon, the consequences of poor performance should be as immediate as possible. If bill credits are to be used, they should be paid within 25 days after the close of the month in which the poor performance took place. At a minimum, CLECs should be entitled to interest, at a business rate, on the credit amounts calculated from the month in which the discriminatory service occurred.

5. Verizon's Plan Fails To Provide Incentives For Accurate Reporting.

Under its proposal, Verizon has no incentive to provide accurate, complete or timely reports, because it suffers no penalties for inaccurate, incomplete and untimely

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[12] Under the New York PAP, when the credits to which a CLEC is entitled exceed the amount of its bill, it receives a check from Verizon in the month for which it is entitled to the bill credits.

[13] The use of bill credits coupled with the manner in which Verizon proposes to allocate the aggregate amount of the "per measure" credit among CLECs on the basis of lines in service (Verizon Performance Plan, Appendix B, at 20) disadvantages CLECs who are attempting to enter the market but do not yet have a substantial portion of the total lines in service—the very CLECs who are most likely to be injured by poor performance on the part of the ILEC. *See* FCC Letter to SBC, at 3.

reports. Indeed, it has an incentive to report scores inaccurately in its own favor. Clearly, any Virginia performance plan must contain financial consequences for inaccurate reporting. Verizon's omission of such a provision is striking, given its inclusion in the New York PAP. The New York PAP was designed to include a Quality Assurance Plan that would penalize Verizon for failures in these areas. In order to ensure that Verizon's monthly reports are useful and accurate, the Commission should impose consequences on Verizon if it fails in this critical area.

6. Verizon's Plan Does Not Include A Change Control Assurance Plan.

A Change Control Assurance Plan, with remedies, was adopted in New York and Massachusetts and also is necessary in Virginia. Verizon's adherence to Change Control processes and rules is essential to a competitive local market. When Verizon fails to follow change control processes, Verizon is not harmed but CLECs may be unable to process orders and serve customers in the manner that customers expect. Further, failure to follow change control processes increases CLECs' costs because they must devote additional resources to play "catch-up" with changes that Verizon has implemented. Apparently, under Verizon's plan, Verizon would face no penalties if it did not follow the proper change control procedures.

7. Verizon Would Be Free To Discriminate Until Verizon Gains Entry Into The Long Distance Market In Virginia.

Without any legal or factual basis, Verizon proposes to delay the effective date of a remedies plan until after it is permitted to enter the interLATA market in Virginia.[14] Apparently, Verizon seeks to be free to discriminate against CLECs without consequence, until it elects to pursue 271 approval.

The Act does not postpone Verizon's obligation to provide non-discriminatory service until it seeks and obtains Section 271 relief. There is no reason for the Commission to entertain such delay. Making Verizon subject to remedies for discriminatory performance will accelerate Verizon's achievement of the statutory requirements and aid Verizon in its effort to pursue 271 authority. CLECs are entitled to non-discriminatory service from Verizon today, and if Verizon fails to provide such service it should be subject to appropriate remedies today.

8. Verizon's Plan Does Not Adequately Account For Ongoing Poor Performance By Verizon.

Verizon proposes a multiplier of 1.5 for standards that are missed for two consecutive months, and a multiplier of 2.0 for standards that are missed for three consecutive months.[15] While this is a step in the right direction, the multipliers do not begin to compensate CLECs for the harm caused by chronically deficient service by Verizon. The multiplier levels are far too modest. In New Jersey, the Board Staff proposed a multiplier of 2.0 and 3.0 for misses of two and three consecutive months, respectively, and 5.0 for four or more months.[16]

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14 Verizon Performance Plan at 2.

15 Verizon Performance Plan at 2.

16 Staff Proposal, Verizon Incentive Plan for the State of New Jersey, October 3, 2000*, In the Matter of The Investigation Regarding Local Exchange Competition For Telecommunications Services*, Docket Nos. TX95120631 et al.

Under the Verizon proposal, it is unclear what the multiplier would be if a standard is missed for more than three consecutive months. Does it remain at 2.0 (and if so, for how long) or does it revert to 1.0? There may be situations where Verizon's poor performance continues for months because it benefits from delay, or simply is unresponsive or ineffective in fixing the problem, while its competitors' ability to compete remains impaired. Verizon's proposal escalates the amount of the remedy as poor performance persists for three consecutive months, but does not fully address the problem. At a minimum, the multiplier should be escalated again after the third month, as the New Jersey Staff recommended, and Verizon's plan clarified so that there is no question that the incentive credit for the fourth consecutive month of poor performance also applies to each month thereafter.

It is also unclear what the multiplier is applied to. Appendix B of Verizon's plan (at 21) states that the credit is "times the amount of the incentive credit *for the first month the standard is missed*." (Emphasis supplied). The example provided by Verizon shows a "moderate" miss. Does that assume that the first month's miss was also a "moderate" miss? What happens if the first month's miss was a "minor" or a "major" miss? Is the multiplier then applied to the amount corresponding to whatever the severity of the miss was in the first month? Verizon will need to clarify these important details.

The proposal also should be revised to account for a situation where Verizon's performance not only is substandard for consecutive months but also worsens during those months. For instance, if Verizon's poor performance falls into the "minor" category for the first month but then falls into the "moderate" or "major"

category in the second and third months, the remedies should escalate. It would create the wrong incentive to base escalation of the remedy solely upon the first month performance.

The three-tier escalation structure proposed by Verizon, consisting of "minor," "moderate" and "major" categories and the separate escalation of remedies for chronic discriminatory performance, does not adequately incent Verizon to correct continuing or worsening poor performance. Under the proposal, if Verizon's performance is substantially worse then the threshold set for the "major" category, Verizon is not subjected to any increased incentive to fix the problem, no matter how much worse the discrimination gets. In situations where Verizon's performance is so poor as to fall into this category, the incentive plan should be structured so that Verizon does not benefit by delay in fixing the problem while CLECs increasingly are harmed in the marketplace.[17] AT&T's Plan does this.

The plan should also account for situations where Verizon's performance is poor at least half the time over a rolling six month period, *i.e*., poor performance for any three months in a six month period, such as the first, third, and fifth months. If CLECs cannot depend on Verizon to meet its obligations consistently, then CLECs and customers are harmed. CLECs will be forced to commit to customers a level of service that is at the lowest common denominator of Verizon's performance over time, because of Verizon's discriminatory performance some of the time. Routine

[17] It should be noted that the definition of a "minor" fault begins with a 0.1% failure rate, rather than any value above zero. While seemingly insignificant, this is an unjustified mitigation, especially for measures that have little variance because of large sample size.

discrimination is extremely harmful to competition, even if it is not in consecutive months, and effective deterrents must be in place to prevent its occurrence.

9. Verizon's Plan Does Not Measure And Provides No Remedies When Sample Size Falls Below Ten For Any Measure.

Verizon does not measure and eschews remedies whenever the sample size for a measure falls below 10 in any month, for both Parity and Benchmark standards.[18] In Virginia, a sizeable portion of measures may well fall below the threshold, depending on the CLEC and the service involved. Collocations, for one obvious example, are likely to be less than 10 in any given month for any given CLEC. This is an arbitrary threshold that is easily dealt with by the use of permutation testing, as AT&T's Plan does. There is no good reason to exclude a significant and important subset of measures from compensation under a remedies plan.

The minimum sample size for Benchmark measurements should be one. For example, in Metric NP-2 (Collocation) a CLEC could submit nine collocation applications in a month to start up service to nine exchanges, serving thousands of end users. If one application is late, Verizon gains a competitive advantage in that market by delaying a competitor that intends to serve that market. Similar problems would be created for billing metrics that rely on Benchmark standards. For example, timeliness of a bill is a Benchmark standard, but since the sample size is only one in a month then no remedy applies.

In its proposal, Verizon recommends the use of the hypergeometric distribution function to do the permutation analysis when the sample size is greater

than 10 but less than 30.[19] Verizon relies on collaborative meetings in New York to support this methodology. AT&T does not take issue with the conclusion that there is general agreement that the use of the hypergeometric distribution for measures expressed as proportions is equivalent to doing formal permutation testing. For small sample sizes the use of a correctly calculated hypergeometric distribution is workable. However, for measures expressed as rates, the binominal distribution should be used instead.

But contrary to the suggestion that this issue has been resolved, the New York collaborative participants, including the New York staff, continue to work through various issues related to this methodology. There is not yet agreement that the Microsoft Excel software can perform these calculations correctly. Further, there is evidence from the New York collaborative that other technical issues remain to be resolved in using this methodology. The use of the binominal distributions for rate measures is also under review. Thus, more deliberation on this matter is warranted before it is adopted.

10. The Use Of Per Unit Remedies, as set forth in the Verizon Plan, Is Inadequate To Protect Competition.

With per unit remedies, Verizon's liability to CLECs for services that are either just starting up or have a small customer base is unreasonably reduced because the number of units is small. For instance, when a CLEC first enters a market it is unlikely to generate high volumes of orders but is extremely vulnerable to discriminatory performance by Verizon from which it may be unable to recover. One

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[18] Verizon Performance Plan at 7.

example would be the provisioning of DSL service that may not be rolled-out on a mass market basis immediately. This risk alone has a chilling effect on competition. Similarly, a number of metrics involve critical activities that by their very nature will not involve substantial units. Collocation metrics are perhaps the most obvious. To limit remedies for such metrics would inhibit, if not halt, competition.

Not withstanding these significant deficiencies, in the event that per unit remedies are included, then Verizon should be liable for all failed units, not just those associated with a failed submeasure. Otherwise, competition is harmed without providing any reasonable incentive for Verizon to promptly correct the harm.

11. The Severity Of A Miss In Percentage Measures Is Masked Because The Method Of Defining Severity Is Not Normalized.

Verizon's proposal does not account for critical differences with respect to missing Benchmark standards that are expressed as percentages. A Benchmark of 99% that is missed by 5% is an extremely severe miss, whereas a 5% miss of a 90% Benchmark is less severe, since it applies to a less well-controlled process. The severity of a miss must also be scaled by the size of the population. The Verizon plan makes no such distinctions. A potential impact of this shortcoming is that service to a CLEC could deteriorate to extremely poor levels without any meaningful penalty, while Verizon could continue to provide excellent service to its own retail customers. In contrast, AT&T's Performance Incentive Plan takes the severity of a

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[19] Verizon Performance Plan at 7.

performance failure more appropriately into account and shapes the remedies accordingly.

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WHEREFORE, AT&T recommends adoption of a plan consistent with the AT&T Performance Incentive Plan. The Plan avoids the problems of Verizon's proposal. The AT&T Plan best reflects the realities of the current marketplace and contains a complete set of the incentives and remedies that are necessary to protect both CLECs and Virginia customers from the effects of poor performance by Verizon. In the alternative, if the Commission were to adopt the Verizon plan, it should be modified as outlined above.

Respectfully submitted,

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Performance Incentive Plan
For Verizon Virginia, Inc.
June 22, 2001

Introduction

It is well recognized that a meaningful system of self-enforcing consequences for discriminatory ILEC performance is critically important to the protection of the public's interest and the rapid and sustainable development of a competitive local telecommunications market. Incumbent LECs have strong business incentives and means to maintain their current monopolies through the delivery of inadequate and unlawful levels of operations support for CLECs. Thus, an appropriate system of self-enforcing consequences is absolutely necessary to assure that the competitive local telecommunications markets envisioned by the 1996 Act will be able to develop and survive.

In order to be effective, prompt enforcement of appropriate consequences must be assured. Because of the extensive delays inherent in the adjudication and appeals process, CLECs cannot rely solely upon the legal/regulatory process to obtain appropriate remedies for discriminatory ILEC performance. Furthermore, the consequences must provide Verizon with incentives that exceed the benefits it may derive by inhibiting competition, and such consequences must be immediately imposed upon a demonstration of poor Verizon performance. The objective is to set the incentives in amounts that encourage Verizon to take proactive steps to prevent its performance from becoming non-compliant and, when it does reach that level, to correct its performance failures promptly.

It is beyond dispute that any system of self-enforcing consequences must be based upon an underlying set of performance measurements that cover the full panoply of Verizon activities upon which CLECs must rely to deliver their own retail service offerings. The Act requires that these activities, which touch upon every aspect of the business relationship between incumbents and CLECs, must

be provided in a non-discriminatory manner. Thus, the interconnection agreements between incumbents and CLECs should ideally serve as a source for performance measurements. However, experience in Virginia and elsewhere has proven that CLECs have generally been unable to individually negotiate, or even arbitrate, a sufficiently robust set of performance measurements.[1] For that reason, the first step in constructing a system of self-enforcing consequences must include careful consideration of the adequacy of the underlying measurement set. At a minimum, the performance measurements must supply each CLEC with reliable data on the incumbent's performance for that CLEC. Such data must be sufficiently discrete (as to the processes monitored) and detailed (to isolate and compare only comparable conditions) so as to permit a CLEC to enforce the terms of its interconnection agreement with the incumbent. In addition, the underlying performance measurement system should demonstrate quality implementation of the following characteristics:

- A comprehensive set of comparative measurements that monitors all areas of support (i.e., pre-ordering, ordering, provisioning, maintenance & repair and billing) without preference to any particular mode of market entry;
- Measurements and methodologies that are documented in detail so that clarity exists regarding what will be measured, how it will be measured and in what situations a particular event may be excluded from monitoring (such exclusions must also be tracked and reported);
- Sufficient disaggregation of results, so that only the results for similar operational conditions are compared and, particularly, so that the averaging of results will not mask discrimination;[2]

[1] The Virginia Collaborative Committee is in the process of considering performance metrics and standards. AT&T and WorldCom have recently proposed that the metrics and standards used in New York, as modified from time to time, be used in Virginia as well. Comments on this proposal are due June 29, 2001.

[2] The importance of sufficient disaggregation is more fully discussed in Attachment A.

- Pre-specified and pro-competitive performance standards exist. This includes identifying reasonably analogous performance delivered by the incumbent to its own operations[3] or, when such comparative standards are not readily identifiable, that absolute minimum standards for performance (benchmarks) are established;[4]
- Sound quantitative methodology is used to compare CLEC experiences to analogous incumbent support;[5] and
- The overall performance measurement system is subject to initial and periodic validation, in order to assure that the performance results which form the foundation for all decisions regarding the quality of the performance delivered by the ILEC are correct representations of the CLECs' marketplace experience.

It is critical that a performance measurement system incorporating all of the above characteristics exist before applying an incentive plan, because a robust

[3] Analogous performance must be broadly interpreted and consider not only retail operations of the incumbent but also operations of affiliates. Often the incumbent's asserted lack of analogous performance relies upon very narrow (and inappropriate) interpretation of the term "analogous" to mean "precisely identical" rather than "similar in key aspects." Furthermore, if the incumbent delivers different levels of performance to an affiliate and its the retail operations, the CLEC experience should be compared to the better of the two.

[4] In all cases, benchmarks must provide an efficient competitor with a meaningful opportunity to compete.

[5] As a general rule, when benchmarks are employed, statistical comparisons of the measured result for the CLEC to the benchmark are not appropriate. Typically, the standards state a minimum performance level that is required to support effective competition and the minimum success level that must be demonstrated to attain the benchmark. Thus, the typical form of the standard is, for example, "95% installed within 3 days." Note that in the preceding example a 5% deviation from the benchmark is permitted and, as a result, the potential for random variation of the performance is fully addressed. Any further accommodation of variation, as would occur if statistical procedures were employed, would effectively "double count" forgiveness of variability.

and independently audited performance measurement system is a prerequisite to any effective system of self-enforcing consequences.[6]

Objectives of the Plan

A system of self-enforcing consequences must fully implement the following objectives:

- Consequences must be based upon the quality of support delivered on individual measures to individual CLECs;
- Total consequences, in the aggregate, must have sufficient impact to motivate compliant performance without the need to apply a remedy repeatedly;
- The imposition of financial consequences must be prompt and certain, and consequences should be self-executing so that opportunities for delay through litigation and regulatory review are minimized;
- Consequences must escalate as the basis for concluding that a performance failure exists becomes more substantial and/or the performance repeatedly fails to meet the applicable standard;
- Additional consequences must apply when non-compliant performance is provided to CLECs on an industry-wide basis;
- Exclusions from consequences must be minimized and the exclusions that are provided for must be monitored and limited to assure they do not mask discrimination;

[6] For example, business rules for individual performance measurements may provide for automatic exclusions of data points from the calculation. If such provisions are made, however, the exclusions must be according to clearly defined rules and the number of data points excluded for each submeasurement and for each CLEC should be reported on a monthly basis.

- Incumbents must have minimal opportunities to avoid consequences through such means as liability caps, offsetting credits, or a requirement that CLECs must demonstrate an ILEC's intent to harm; and

- Potential "entanglement" costs must be minimized so that, for example, access to mitigation measures for the incumbent does not become a means to revert to the legal/regulatory process and delay the application of consequences that should be self-enforcing.

Structure of Consequences for Discriminatory Verizon Performance

Consequences operating on two tiers are proposed. The first tier addresses the consequences for non-compliant performance delivered to an individual CLEC. The second addresses the consequences for non-compliant performance delivered to the CLEC industry as a whole. In general terms, Tier I provides a form of non-exclusive liquidated damages payable to individual CLECs. Tier II, by contrast, incorporates what can be characterized as regulatory fines that are necessary when Verizon's performance affects the competitive market – and consumers -- as a whole.

The total amount of Tier I payments (which are only an estimate of the CLECs' actual damages) is unlikely to provide Verizon with sufficient incentives to take the actions necessary to eliminate its monopoly. Rather, Verizon may decide to treat such payments as the price for retaining its monopoly and voluntarily incur them as a cost of doing business. Moreover, the harm that results when Verizon provides discriminatory support for the CLEC industry in the aggregate has a major impact not only on CLECs but also on the operation of the competitive marketplace in general, which directly affects all Virginia consumers of telecommunications services. Thus, it is appropriate to establish incentives to prevent this type of harm from occurring (or continuing), and both Tier I and Tier

II are necessary and complementary elements of an effective system of consequences. Together, they work in tandem to achieve the goals of the Act.

Tier I Remedies Reflect Harm to Individual CLECs

A Tier I consequence should be payable to an affected CLEC whenever any performance result indicates support delivered by Verizon to an individual CLEC fails to meet or exceed the applicable performance standard.[7]
The first step in establishing Tier I consequences is to define the rule for determining if performance for a particular period "passes" or "fails" and, if it fails, whether additional consequences are warranted. Defining "pass/fail" rules requires that the underlying measurements be mapped into one of two classes:

> (1) those for which the performance standard is parity with analogous incumbent LEC performance results, and
>
> (2) those for which the performance standard is an absolute level of required performance (otherwise known as a benchmark)

The differentiation is important because when parity is the standard, statistical procedures are necessary to draw conclusions regarding compliance. In such situations (which should apply to the vast majority of cases), two separate data sets are compared – one for the CLEC and one for Verizon. Each data set is characterized by a mean and standard deviation. Statistical tests are used to draw a conclusion regarding the likelihood that the data sets with the observed

[7] In the course of establishing Tier I consequences, the rights of an individual CLEC to pursue actual damages must be retained. However, if a CLEC sought to pursue a claim for actual damages, it would be reasonable to offset the damage award by any Tier I payments it received from the ILEC for the same time period and performance areas. In addition, a CLEC must retain the right to waive Tier I claims and pursue its individually negotiated contract remedies (if and only if the claims and remedies are not mutually payable.).

means and standard deviations were drawn from the same population (in this case a support process for CLECs with the same quality and/or timeliness as that employed for Verizon). The proper test further allows determination that parity does not exist, but it does not quantify "how far out of parity" the process is when parity is not indicated.[8]

In contrast, when a benchmark serves as the performance standard, measurement establishes a performance failure directly and assesses the degree to which performance departs from the standard. As explained below, the detailed mechanism for determining a performance failure differs for each of these types of measurement standards, but the principle governing the application of the Tier I consequence is consistent: The consequence escalates with increasing evidence and level of non-compliant performance.

Tier I Business Rules for Parity Measurements

1. Use the Modified z-Statistic to Determine Compliance

The determination of whether performance is compliant (i.e., equal to or better than the appropriate standard) is based on the calculation of the modified z-statistic (z).[9] The calculated modified z-statistic is then compared to the cumulative normal distribution table to determine if parity exists.[10] For any such

[8] Clearly, however, when all other factors are held constant, increased statistical confidence is directly correlated (monotonic) with larger differences in the two sample means being compared and therefore is a reasonable indication of how different ILEC performance was for itself versus that of the CLEC in the period of observation.

[9] See Attachment B, Local Competition Users Group - Statistical Tests for Local Service Parity, February 6, 1998, Version 1.0, for documentation of the calculation and use of the modified z-statistic.

[10] The modified z-statistic computation provides for the CLEC mean to be subtracted from the ILEC mean. Thus, a negative z-statistic critical value presumes that worse performance exists when the CLEC mean becomes larger than the ILEC mean. For example, worse performance exists when the order completion interval for the CLEC exceeds that for the ILEC. Thus a negative z-statistic critical value is appropriate. On

decision rule, the probability of an erroneous decision is known. For example, if the critical value is –3.00 and parity actually exists, the probability of saying it is not is 0.13%.

2. Use Permutation Analysis for Small Samples

Permutation analysis is employed for small data sets (those with 30 or fewer observations in one of the data sets to be compared) to create a probability distribution as an alternative to the cumulative normal distribution.[11] By mutual agreement, permutation analysis can also be employed for larger data sets.

3. Use the Balancing Critical Value

The threshold level to determine whether or not a performance failure exists is established by balancing Type I and Type II error. The key consideration is balancing the probability of drawing erroneous conclusions -- either that performance is "bad" when it is actually "good" (Type I error) or that performance is "good" when it is actually "bad" (Type II error). The former error adversely impacts ILECs and the latter adversely impacts CLECs. Unfortunately, reducing the likelihood of one type of error increases the likelihood of the other type of error occurring. Thus the best means to create an equitable outcome for all parties is to balance the Type I and Type II error.

This balance point is a function of the size of the CLEC data set (assuming the Verizon data set is very large) and the extent to which the means for the two data sets differ (assuming that both data sets are normally distributed). Simulation

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the other hand, for a metric like "% completed within x days", worse performance for the CLEC occurs when the metric result is smaller for the CLEC vis-à-vis the ILEC. In this case a positive z-statistic critical value is appropriate.

[11] See Attachment C for a description of the procedural steps for performing permutation analysis. Verizon and the CLECs generally concur that permutation analysis is appropriate for data sets of this size.

comparing relatively small data sets (as would be likely for a CLEC) to a much larger data set (as would likely exist for Verizon) demonstrates that the balancing of Type I and Type II error can reasonably be expected to occur in the range of 25% for "samples" with fewer than 100 data points but is about 5% for samples with 1000 data points.[12] The statistical methodology developed by AT&T and Ernst & Young in Louisiana is an appropriate method for calculating the critical values which depend on the sample size and balances Type I and Type II error probabilities for each given submeasure. However, the implementation of that methodology by Verizon to calculate consequences is incorrect. Furthermore, the definition of the alternative hypothesis required to perform the balancing is fundamental to the applicability of the method. AT&T proposes a value of 0.25 for the parameter δ and appropriately corresponding values for ε and ψ.[13][14]

4. Increase Consequences as the Confidence in a "Non-Parity" Conclusion Increases

An appropriate means to take increased confidence into consideration is to provide for higher amounts of monetary consequences as the confidence in the "non-parity" conclusion increases. This is justified because (all other factors held constant) as the difference in the mean performance for the CLEC compared to the ILEC becomes larger, the absolute value of the modified z-statistic also becomes larger for the sample in the time period of interest. Thus, it is appropriate that the performance consequence should escalate based upon the calculated value of the modified z-statistic.

[12] See Response to Question 3 contained in AT&T Ex Parte filed in CC Docket 98-56 dated July 13, 1999.

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

[14] See Attachment D for a further discussion of this position.

5. After a Failed Parity Test the Consequences Should Escalate and Vary Continuously with Severity of Failure

A parity failure is established for a submeasure by comparing the measured value of the modified z-statistic (z) to the balancing critical value (z*) appropriate for the submeasure's sample size during the given monthly period. Once a submeasure failure is obtained, the calculated remedy should be a continuous function of severity of the failure as measured by the magnitude of the modified z-statistic. In this way small changes in severity lead to small changes in consequences thus assuring that mathematically chaotic behavior is avoided at step thresholds. However, to incent the ILEC appropriately, the change in consequences should increase with each unit of severity. This form of consequences as a function of severity is most simply accomplished by the use of a quadratic function of the ratio of the measured modified z score to the balancing critical value (z/z*). Fixing the value of the quadratic or its slope at three points completely determines the function.

Table 1

Range of modified z-statistic value (z)	Performance Designation	Applicable Consequence ($)
greater than or equal z*	Compliant	0
less than z* to 5z*/3	Basic Failure	$a(z/z^*)^2 + b(z/z^*) + c$
less than 5z*/3 to 3z*	Intermediate Failure	
less than 3z*	Severe Failure	25,000

Table 1 shows the applicable consequences for each Tier I parity submeasure failure for each CLEC. In this table z* is the (negative) balancing critical value for the submeasure, and the coefficients of the smooth consequence function are:

a = 5625
b = -11250
c = 8125.

Note that the smooth consequences formula is an explicit function of the ratio of the modified z-statistic and the balancing critical value (z/z*). This means that the dollar amount does not depend on the number of observations but only on the degree of violation. If we had 100 times as many observations, with means and standard deviations staying the same, both z and z* will increase by a factor of 10 and the consequences will be unchanged. Note also that both basic and intermediate failures are defined and may occur in the smooth region of the formula. The plan retains these designations to allow for classification of performance for more general performance monitoring such as compliance testing, if needed.

A graph of the applicable consequences as a function of the measured modified z-statistic is given in Attachment G in Figure G-1. The attachment also contains a small step tabulation of the function that approximately represents it in Table G-1.

Examples

Four hypothetical examples of consequence calculations are given in the matrix below.

Example	z*	z	Performance	Consequence
1	-2.00	-1.80	Compliant	$0
2	-2.50	-3.33	Basic Failure	$3,125
3	-3.00	-6.00	Intermediate Failure	$8,125
4	-3.50	-12.00	Severe Failure	$25,000

In example 1 the hypothetical balancing critical value for the submeasure is calculated to be –2.00 on the basis of sample size and equal type I and type II error probabilities. The observed value of the modified z-statistic, based on ILEC and CLEC performance for that submeasure, is –1.80. The ILEC is compliant for this submeasure and no consequences are due to this CLEC.

Example 2 shows a balancing critical value calculated to be –2.50. Furthermore in this example, the measured value of the modified z-statistic is –3.33. This is a Basic Failure and the consequence is calculated to be $3,125 by the formula in Table 1.

In example 3, although the hypothetical balancing critical value is –3.00, the measured value of the modified z-statistic is well below this at –6.00. According to the range of modified z-statistics in Table 1 this is an Intermediate Failure. The same smooth formula is used to calculate the remedy amount as $8,125.

The final example 4 shows a balancing critical value of –3.50, but a very poor measured value of the modified z-statistic of –12.00. According to Table 1 this is classified as a Severe Failure and generates a consequence of $25,000. This is the largest consequence for which the ILEC would be liable for this submeasure this month to this CLEC.

Tier I Business Rules for Benchmark Measurements

1. Use a "Bright Line" Test for Benchmark Measurements

A benchmark is set to define the level of performance that is judged essential to permit competition to develop on a going-forward basis. As such, the benchmark level is at the lower range of what a viable competitive support process should be capable of delivering on a routine basis. Indeed, to assume otherwise would imply that the benchmark would not be achieved on a routine basis. In all events, because even the most tightly controlled process will produce performance outside the expected range, some margin of error is typically provided for the incumbent. Thus, the limiting performance is expressed as "B% meet or exceed the benchmark" where "B%" is a proportion figure set less than 100% in order to account for random variation considerations. Accordingly, a performance failure should be declared if the calculated performance is not equal to the "B%" level. For example, if the calculated result for a month was 94.5% of all orders completed within 3 days but the benchmark was 95% within 3 days, then a performance failure occurred. No subsequent application of a statistical test is appropriate.

2. Apply an Adjustment for Small Data Sets When Necessary

Because some measurement results may be calculated using small data sets, some adjustment is warranted. This need arises because the benchmark proportion for a particular measure with few underlying data points may be practically impossible to attain unless Verizon always performs perfectly. The metric discussed in the prior paragraph can be used to illustrate the point: if only ten orders were completed in the month, then compliance would occur only if all 10 orders were (correctly) completed within three days. One order taking longer

than 3 days would mean that, at best, the performance result would be 90% within 3 days, i.e., a failing performance level.

This situation is addressed through application of the following table[15]:

Table 2

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

3. Increase Consequences for Increasingly Poor Performance

As with measurements that are judged against a parity standard, those compared to a benchmark standard should be subject to additional consequences as the performance becomes increasingly worse compared to the benchmark. The escalation is as follows (Note that "B" in Table 3, is the Benchmark Percentage as determined from Table 2):

[15] The table can be expanded to include all possible data set sizes from 1 upward.

Table 3

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

In Table 3 the quantity x is the actually measured proportion and the coefficients are given by:

d = 22500

e = -45000

f = 22500

g = 2500

A graph of the applicable consequences as a function of the measured benchmark result, x, for B=95% is given in Attachment G in Figure G-2. The attachment also contains a small step tabulation of the function that approximately represents it in Table G-2.

Example:

As an example of this consequence calculation, consider a benchmark with a proportion B=95%. Now if the measured performance is 93%, the first and second columns show that this is a Basic Failure. Plugging this 2% failure of the 95% benchmark proportion into the quadratic equation of the third column in the table gives a calculated consequence of $6,100 for this submeasure and CLEC.

Table 3 is applicable for any benchmark expressed as B% proportion better than L level, and all benchmarks may be easily expressed in this form.

Additional Tier I Business Rules Applicable to All Measurements

1. Increase Consequences for Chronic Performance Failures

Regardless of the type of measurement (parity or benchmark), if performance fails to achieve the Compliant level in consecutive reporting periods, then additional consequences should apply. The recommended treatment for chronic failures is to assess a chronic failure over-ride in the third consecutive month of non-compliant performance. When the chronic failure override applies, a consequence equal to a "Severe Failure" ($25,000 per chronic failure per month) should apply until such time as performance for the specific measurement result is again classified as Compliant.[16]

2. No Additional Protection of Verizon is needed through Forgiveness Mechanisms or Mitigation Methods

Properly calibrated performance measures and balancing the probabilities of statistical errors eliminate any need for additional forms of protection for incumbents with respect to considerations of random variation.[17] Moreover, a

[16] Alternatively, it is possible to institute consequences for repeated failures as early as the second consecutive month of failure. The amount of the consequence under such a structure would escalate more gradually. See Attachment A, Table A of MCI Worldcom and AT&T Joint Remedies Proposal Ex Parte filed in CC Docket 98-56, filed June 2, 1999.

[17] See Attachment E for further discussion of random variation and the inappropriateness of providing further mitigation if Type I and Type II error is balanced as recommended in this proposal.

procedural cap such as the one described below should allay any fears that additional protections are necessary for Verizon.[18]

Tier II Remedies Reflect Harm to the Public Interest In a Competitive Marketplace.

Tier II consequences are intended to enhance the Verizon's incentives to provide performance that complies with its statutory obligations. Tier I consequences only compensate individual CLECs who actually receive discriminatory treatment from Verizon. Tier II consequences are designed to counterbalance Verizon's incentive to damage not just individual firms but the competitive marketplace itself. Thus, the two types of consequences are complementary, and both are necessary to achieve the intended results.

The applicability of Tier II consequences should be determined using the aggregate data for all CLECs within a particular submeasurement result and disaggregation.[19] Except as noted below, identical business rules and measurements should be utilized as for Tier I. Thus, virtually the same data and computational processes can be utilized for both tiers. The differences are highlighted below and are due largely to a reduction of the consequence threshold below the balancing critical value. The smaller threshold is recommended because higher consequences are proposed, so the confidence in the decision to apply a consequence should be greater.

[18] Because the rationale for providing consequence offsets is the possibility of random variation, there is no justification for applying offsets to measurements that are monitored through the use of benchmarks. As explained above, random variability impacts are fully cared for in the structure of the benchmark standard, by permitting in advance a percentage of performance "misses."

[19] Each occurrence counts equally in this calculation. Thus, the individual results for individual CLECs are not averaged together; rather the performance for all CLECs is pooled for each submeasurement result. Thus the pooled data analysis effectively creates a "super CLEC" for the purposes of determining Tier II consequences.

Because Tier II consequences reflect harm to the public interest in a competitive marketplace, consequences under Tier II, unlike Tier I payments, should be paid to a public fund identified by the Commission and may be used for competitively neutral public purposes.[20]

Tier II Business Rules for Parity Measurements.

The same business rules apply under Tier II to the aggregate (or pooled) data of the individual CLECs as are employed for the individual CLEC data under Tier I, except a smaller consequence threshold is used.[21] As a result, the applicable consequence table (Table 1 above) is modified as follows:

Table 4

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

Here z* is the balancing critical value for the given submeasure aggregated over all the CLECs, and the coefficients of the smooth consequence function are again:

a = 5625

b = -11250

c = 8125.

[20] Thus, under Tier II, individual CLECs are not compensated.

[21] Alternative methodology exists for determining Tier II consequences. See, for example, the June 2, 1999 Joint AT&T and MCI ex parte filing made with the FCC in CC Docket 98-56.

The quantity n is the market penetration factor explained below.

A graph of the applicable consequences as a function of the measured modified z-score (z) is given in Attachment G in Figure G-3. The attachment also contains a small step tabulation of the function that approximately represents it in Table G-3.

Tier II Business Rules for Benchmark Measurements

The same business rules apply under Tier II to the aggregate (or pooled) data of the individual CLECs as are employed for the individual CLEC data under Tier I, except that consequences do not apply until the pooled CLEC performance results degrades to a point that is equivalent to an intermediate failure designation at the Tier I level. As with parity measures, the applicable consequences are adjusted to reflect the broader consequences of poor performance for the entire CLEC industry and the concomitant effects on the market and consumers.

Table 5

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

For Table 5, x is the actually measured proportion and the coefficients are again given by:

d = 22500
e = -45000
f = 22500
g = 2500

The quantity n is the market penetration factor explained below.

A graph of the applicable consequences as a function of the measured benchmark result, x, for B=95% and n=10 is given in Attachment G in Figure G-4. The attachment also contains a small step tabulation of the function that approximately represents it in Table G-4.

Establishing the Value of "n" for Tier II

For both Tier II tables (Tables 4 and 5), the value for "n" should be determined based upon the most recent data for the state and company under consideration (in this case Virginia) relating to resold lines (Table 3.1) and UNE loops (Table 3.3) as reported in the most recent Report of Local Competition published by the FCC.[22] In effect, "n" is a multiplier for the Tier II consequence amount that takes into account, in general terms, the extent of competitive penetration within the state.[23]

[22] If a company is not explicitly identified, then the aggregate result for the state would be utilized.

[23] The calculation for a particular ILEC and state would be based on the most current data reported to the FCC and be as follows: (resold lines + UNE loops)/(total switched lines).

Table 6

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

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

Other Considerations

1. Procedural Caps May Be Useful If Properly Implemented

In the course of early state consideration of consequence plans, regulators and incumbents expressed concern regarding the possible size of payments that an incumbent might be required to pay. In response, proposals were made to cap incumbents' potential liability. As a threshold matter, it should be noted that this concern reflects a tacit acknowledgement that the performance delivered by the incumbents has to date been largely non-complaint. Moreover, to the extent that any cap is considered at all, the very important difference between absolute and procedural caps must be recognized. As shown below, if the Commission

establishes any caps at all, they should be purely procedural and not place an absolute limit on the potential consequence payments due from Verizon.[24]

The difference between procedural and absolute caps is significant. Absolute caps should be avoided entirely. First, such caps provide Verizon with the means to evaluate the cost of market share retention through delivery of non-compliant performance. Second, absolute caps send the signal that once Verizon's performance deteriorates to a particular level (i.e., reaching the absolute cap) then further deterioration is irrelevant.[25]

Procedural caps, on the other hand, establish a preset level at which Verizon could seek regulatory review of the consequences that are due. However, the cap would not automatically absolve Verizon of liability for a consequence. Procedural caps, therefore, avoid both of the problems of absolute caps. They do not provide Verizon with the opportunity to evaluate the "cost" of retaining share through non-compliance. Likewise, they do not absolve Verizon from consequences for unchecked performance deterioration.

To the extent a procedural cap is employed, it should be tailored to achieve the following:

> (1) A meaningful level of consequences must be available before the procedural cap applies;

[24] In this regard, it should be noted that the main purpose of any system of incentives is to have Verizon accept its legal responsibility to perform at appropriate levels and not pay any consequences at all.

[25] Similarly, the use of weightings for individual performance measurements to determine the amount of consequences should also be avoided. Any weighting process is inherently subjective and thus arbitrary. Moreover, use of weightings may inappropriately influence the market entry mode selected by a particular CLEC. It is far superior to permit the market to determine which measures are most important by seeing what functions customers need from CLECs, and that CLECs in turn need from Verizon.

(2) The procedural cap should apply on a rolling twelve-month period and not to individual months;

(3) The procedural cap should not apply to Tier I consequences for the CLECs but only Tier II consequences.[26] No other caps should be applicable.

(4) To the extent that a procedural cap is exceeded, Verizon must pay out consequences up to the procedural cap and put the amount in excess of the cap in an escrow account that earns a minimum interest rate as approved by the Commission; and

(5) The Commission shall decide whether and to what extent the amount in excess of the procedural cap should be paid out. Verizon should pay out any amount in excess of the cap, including accrued interest, according to Commission order.

The level of the procedural cap must be set high enough that meaningful incentives are immediately payable without intervention of the Commission. To permit otherwise would effectively prevent the performance consequences from being self-enforcing. It is reasonable to expect that any procedural cap should be proportionate to the size of the local market at issue. It is therefore recommended that, if a procedural cap is adopted, that it be determined from the estimated dollar amount that the ILEC stands to retain in monopoly based revenues.[27]

[26] As noted above, Tier I consequences principally act as a form of liquidated damages. Thus, there is no justification for capping such consequences whether for an individual CLEC or for the CLEC industry as a whole.

[27] See Affidavit of R. Glenn Hubbard and William H. Lehr on behalf of AT&T Corp. AT&T Exhibit _ before the Federal Communications Commission, Washington, D.C. 20544, in the matter of application by New York Telephone Company (d/b/a Bell Atlantic-New York). CC Docket No. 99-295.

2. Other Provisions Protect Verizon From The Impact Of Extraordinary Events

The cut of a single cable may result in higher trouble rates and longer mean times to repair over a short period of time. This is referred to as clustering. While clustering may in fact occur, there is no particular reason to believe that any such events would result in disproportionate impacts on Verizon or even the CLECs. Furthermore, there may be other events demonstrably beyond the control of Verizon that may affect its service quality differently from the CLECs'. This condition does not argue that automatic exclusion should be provided for an otherwise applicable consequence. Nevertheless, Verizon should not be denied protection from extraordinary impacts not anticipated in the construction of the consequence plan[28]. As a result, if such events occur, Verizon should be permitted to pursue relief according to the following:

(1) Verizon should notify the Commission and any potentially affected CLEC(s), using written and verifiable means of notice, of the intent to pursue an exception. Such notification must be provided before the applicable consequence is payable; otherwise Verizon waives its rights.

(2) All consequences not at issue under the exception petition must be immediately payable as provided for elsewhere in the plan. Those that are subject of the potential exemption shall be paid into an interest bearing escrow

[28] Root cause analysis should not defer payments of consequences. Verizon must be liable to pay any consequences for poor performance. Completion of root cause analysis must not be a prerequisite for the delivery of payments to either the CLEC(s) or to the designated Tier II fund. Root cause analyses tend to be time consuming to conduct. While root cause analysis is desirable for long range performance improvement purposes, it is antithetical to self-enforcing consequences. Finally, the provisions set forth in the immediately preceding section provide a procedural mechanism available to Verizon should after-the-fact root cause analysis indicate that a consequence was misapplied from Verizon's perspective.

account no later than the due date applicable to the consequences that are at issue.

(3) No later than 15 calendar days following the due date of the consequences for which an exemption is sought, the incumbent shall submit to the Commission and all other affected parties all factual evidence supporting the exemption. To the extent Verizon seeks proprietary protection of the information submitted, it shall employ a standard nondisclosure form, approved by the Commission, before the plan is put into operation. Verizon may not rely upon the lack of the proprietary form as a basis to delay the submission to the Commission, nor may the incumbent delay access to information by any CLEC that agrees to sign the standard nondisclosure form.

(4) By the later of 30 calendar days following notice by the incumbent or 15 calendar days following Verizon's compliance with (3) above, interested CLECs shall file comments regarding the requested exemption. By mutual agreement, this period may be extended up to 15 calendar days.

(5) Following closure of the comment period provided in (4), if Verizon and CLEC(s) have not reached a mutually agreeable settlement, the Commission shall either

(a) render a decision regarding the requested exemption, or

(b) seek further comment. The Commission shall render its decision regarding the exemption, which shall be binding on all parties, within 90 calendar days of the payment due date of the consequences at issue.

(6) Payout of the consequences shall be according to Commission direction and liquidate the entire escrow account, including accrued interest. In addition, Verizon should be responsible for reimbursing reasonably incurred legal fees of the CLECs. Such amounts should be reimbursed in the following proportion:

[1-(amount returned to the incumbent)]/total escrow balance at liquidation.

As discussed in Attachment F, other steps may be taken to address potential measurement correlation issues once actual data has been gathered under the performance measurement system.

3. Additional Consequences Enforce the Operation of the Plan

Additional consequences should be applicable for other Verizon failures related to performance reporting. At a minimum, consequences for the following areas of non-compliance are appropriate:

Late performance reports - If performance data and associated reports are not available to the CLECs by the due day, Verizon should be liable for payments of $5,000 to a state fund for every day past the due date for delivery of the reports and data. Verizon's liability should be determined based on the latest report delivered to a CLEC.

Incomplete or revised reports - If performance data and reports are incomplete, or if previously reported data are revised, then Verizon should be liable for payments of $1,000 to a state fund for every day past the due date for delivery of the original reports.

Inability to access detailed data - If a CLEC cannot access its detailed data underlying Verizon's performance reports due to failures under the control of Verizon, then Verizon should pay the affected CLEC $1000 per day (or portion thereof) until such data are made available.

Interest on late consequence payments - If Verizon fails to remit a consequence payment by the 15th business day following the due date of the data and the

reports upon which the consequences are based, then it should be liable for accrued interest for every day that the payment is late. A per diem interest rate that is equivalent to Verizon's rate of return for its regulated services for the most recent reporting year should apply.

Attachment A

Sufficient Disaggregation Is Essential to Permit Detection of Discrimination

A meaningful system of performance consequences cannot operate without a high-quality system of performance measurements. This requires not only a robust system of performance measurements that monitors all key aspects of market entry and ILEC support but also that the results derived from such measurements are sufficiently discrete to permit meaningful comparisons.[29]

Sufficient disaggregation is absolutely essential for accurate comparison of results to expected performance. This is true regardless of whether parity or a benchmark serves as the performance standard. Inadequate disaggregation of results means that not all key factors driving differences in performance results have been identified, which in turn interjects needless variability into the computed results. Such an outcome has two adverse effects. First, the ability to detect real differences is reduced for parity measures, because the modified z-statistic employs only the incumbent's variance in the denominator, which will increase with inappropriate averaging of dissimilar results (thus causing the calculated z-statistic to be smaller). Second, benchmark standards may be more permissive, both in terms of the absolute standard and the percentage "miss" accepted (to the extent it is factually supported at all), if the factual data underlying them are averages of widely divergent processes. Accordingly, inadequately disaggregated data impose very lenient targets that result in a very low probability that performance requirements will be missed.

[29] Although some incumbents have raised vague concerns that sufficient disaggregation of results may over-burden regulators, those concerns are unfounded for two reasons. First, careful advance specification of disaggregation requirements will reduce, rather than increase, regulatory burden and permit superior quality decision making. Second, if fewer performance results are desired, statistical procedures for re-aggregating disaggregated results provide a superior approach to reliance upon overly aggregated measurement results.

Only incumbents, such as Verizon, have access to the highly detailed information regarding their retail performance necessary to determine the level of disaggregation that is required to permit apples-to-apples comparisons. Moreover, there are analytical procedures that allow factual conclusions to be made regarding how much disaggregation is "enough."[30] Indeed, in the limited instances where CLECs have been provided access to ILEC data and at least limited public disclosure of analysis was permitted, the facts showed both that ILECs have very detailed data and that very disaggregated results comparisons are necessary to avoid bias.[31]

Establishing the appropriate level of disaggregation is not a "once-and-done" undertaking. Provision can be made to review, perhaps annually, the appropriateness of the disaggregation contained in Verizon's performance measurement system. In this review process, Verizon may demonstrate, through data it has collected pursuant to its performance measurement system, that the existing level of disaggregation is not providing any additional insight to an assessment of its performance quality and nondiscrimination. In that same review process, individual CLECs should also be permitted to request additional disaggregation.[32] The party requesting a change should have the burden of showing why the proposed change is appropriate provided that all parties have equal access to detailed data necessary to support the proposal.

There should not be any presumption that additional disaggregation creates a burden, for either Verizon or this Commission. For Verizon and all incumbents in general, additional disaggregation (once correct implementation is validated) simply involves repetitive computation – a task readily and quickly accomplished

[30] For example, regression procedures may provide a workable methodology for establishing the extent of disaggregation required to make accurate comparisons.

[31] See AT&T Ex Parte filed July 20, 1999 in CC Docket 98-56.

[32] In such cases, the requesting CLEC should be required to make its request for further disaggregation to the incumbent LEC at least three months before initiation of the review process.

by today's computers. Such a small and largely one-time effort is a small price to pay for the vastly improved capability to protect the prospects for competition in Virginia.

Attachment B

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 **32**

INTRODUCTION **33**

PURPOSE 33
SERVICE QUALITY MEASUREMENTS 33
WHY WE NEED TO USE STATISTICAL TESTS 34

BASIC CONCEPTS AND TERMS **35**

POPULATIONS AND SAMPLES 35
MEASURES OF CENTRAL TENDENCY AND SPREAD 36
SAMPLING DISTRIBUTION OF THE SAMPLE MEAN 37
THE Z-TEST 38
TYPE 1 ERRORS AND TYPE 2 ERRORS 40
TESTS OF PROPORTIONS AND RATES 40

PROPOSED TEST PROCEDURES **41**

APPLYING THE APPROPRIATE TEST 41
TEST FOR PARITY IN MEANS 42
TEST FOR PARITY IN PROPORTIONS 42
TEST FOR PARITY IN RATES 43

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 support. 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 Answer 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.

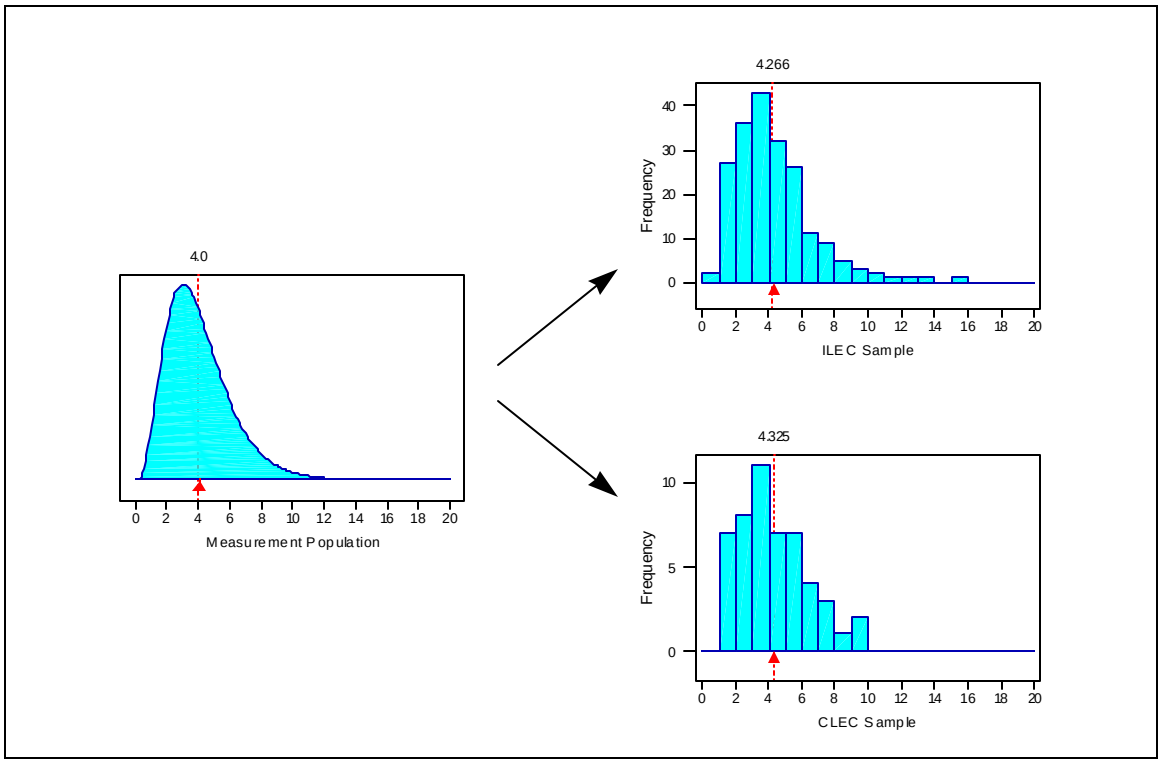

Figure 1.

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

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

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

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

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).

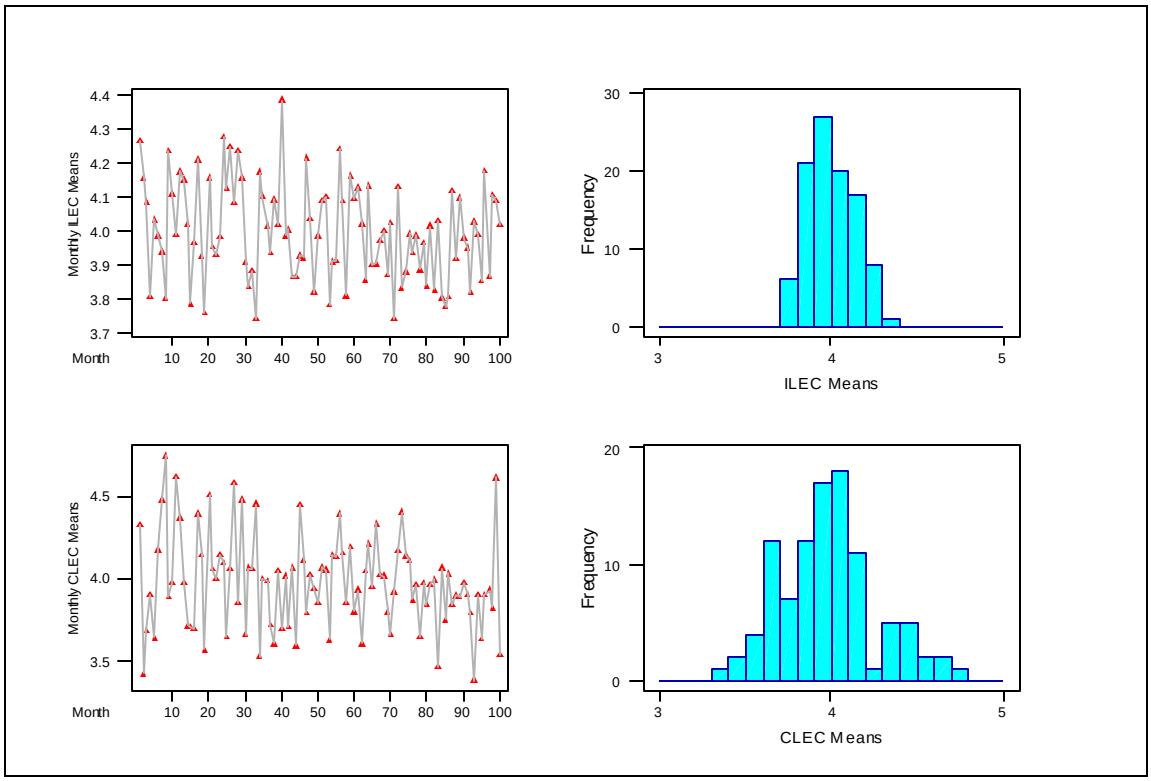

Figure 2.

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.*, $DIFF = \bar{x}_{\mathrm{CLEC}} - \bar{x}_{\mathrm{ILEC}}$) 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.

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

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

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

where 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.[33]

We do not know the true value of the population because the population cannot be fully observed. However, we can estimate given the standard deviation of the ILEC sample ($_{\text{ILEC}}$).[34] Hence, we may estimate the standard error of the difference with

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

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".

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

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

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

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

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[35]; 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.

Measurement (Corresponding LCUG Number)	*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 $\geq$ 90 Days (OP-10)	**Proportion**
% Orders Held $\geq$ 15 Days (OP-11)	**Proportion**
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**

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

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 ($\bar{x}_{ILEC}$ and $\bar{x}_{CLEC}$), and the sample standard deviations ($_{ILEC}$ and $_{CLEC}$).

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

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

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	
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 $DIFF = p_{CLEC} - p_{ILEC}$, 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

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

4. Hence 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	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

Attachment C

Permutation Analysis Procedural Steps

Permutation analysis is applied to calculate the z-statistic using the following logic:

1. Choose a sufficiently large number T.

2. Pool and mix the CLEC and ILEC data sets

3. Randomly subdivide the pooled data sets into two pools, one the same size as the original CLEC data set (n_{CLEC}) and one reflecting the remaining data points, (which is equal to the size of the original ILEC data set or n_{ILEC}).

4. Compute and store the Z-test score (Z_S) for this sample.

5. Repeat steps 3 and 4 for the remaining T-1 sample pairs to be analyzed. (If the number of possibilities is less than 1 million, include a programmatic check to prevent drawing the same pair of samples more than once).

6. Order the Z_S results computed and stored in step 4 from lowest to highest.

7. Compute the Z-test score for the original two data sets and find its rank in the ordering determined in step 6.

8. Repeat the steps 2-7 ten times and combine the results to determine P = (Summation of ranks in each of the 10 runs divided by 10T)

9. Using a cumulative standard normal distribution table, find the value Z_A such that the probability (or cumulative area under the standard normal curve) is equal to P calculated in step 8.

10. Compare Z_A with the desired critical value as determined from the critical Z table. If Z_A > the designated critical Z-value in the table, then the performance is non-compliant.

Attachment D

Statistical Demonstrations of Non-Parity are Sufficient: Notes on "Competitive Significance"

Some incumbents have proposed that, when comparing the CLEC data set to the ILEC data set for a particular performance measurement result, a lack of parity should not be declared unless both the performance difference is statistically significant and the difference has "competitive or economic significance." This notion is contrary to FCC's interpretation of the terms of the 1996 Act (the Act). The FCC has found that the term "nondiscriminatory" as used in the Act is a more stringent standard than the "unjust and unreasonable discrimination" standard set forth in other provisions of the Communications Act.[36] Thus, the term "nondiscriminatory access" means that: (1) the quality of performance must be equal among all carriers requesting the support, and (2) where technically feasible, the support must be no less in quality and timeliness than that which the incumbent provides to itself.[37]

Some ILECs have also argued that, as the number of data points underlying the computed performance result increases (all other factors held constant), smaller differences in means will be statistically significant. This statement is true;

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[36] See FCC Docket No. 96-98, Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, First Report and Order released August 8, 1996, ¶ 217, 859 ("Local Competition Order").

[37] Local Competition Order, ¶315 (access must be provided on terms that are "equal to the terms and conditions under which the incumbent LEC provisions such elements to itself"); Second Order on Reconsideration, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket No. 96-98 (released December 13, 1996) ¶9 (OSS access "must be equal to" the access that the ILEC provides to itself); FCC CC Docket No. 97-137, In the Matter of Ameritech Michigan Pursuant to Section 271 of the Communications Act of 1934, as amended, To Provide In-Region InterLATA Services in Michigan, Memorandum Opinion and Order released August 19, 1997 ("Ameritech Michigan Order"),¶139 ("BOC must provide access to competing carriers that is equal to the level of access that the BOC provides to itself . . . in terms of quality, accuracy and timeliness"); ¶166 (ILEC "must provide competing carriers access to such OSS function equal to the access that it provides to its retail operations").

nevertheless, as explained in the text, the consequences defined by this plan do not increase with the number of data points. Therefore, the statistical test and z-score have achieved their exact purposes by *identifying unequal performance* and increasing consequences with *severity* of failure. Furthermore, the term "discriminatory" under the Act should not be confused with direct and provable competitive injury. The language of the Act does not permit the incumbent to discriminate against a CLEC by showing that no specific competitive harm was experienced by the CLEC.[38] Moreover, as a theoretical matter, although statistical science can be used to evaluate the impact of different choices of alternative hypothesis in the balancing methodology, there is not much that an appeal to statistical principles can offer in directing specific choices. These specific choices are best left to telephony experts.

These judgements should consider the financial impact (on the CLECs) of violations of various degrees. s a first approximation, Verizon has data, generated by its routine management procedures, that could be used to calibrate the effect of various violations. The Commission should require Verizon to produce evidence, relating to its management procedures, that would help the Commission understand what deviations from target performance routinely signal the need for correction.

It is certainly not sufficient to consider only the resulting critical values or error probabilities.

[38] Indeed, requiring a CLEC to demonstrate the specific anticompetitive consequences of an ILEC performance failure would effectively render these new protections into mere reiterations of Section II of the Sherman Act. Long experience under antitrust law shows how difficult and protracted such a requirement is in practice.

Attachment E

Mitigation for Potential Impacts of Random Variation is Unnecessary When Type I and Type II Error is Balanced

Random variation is differences in the expected output (or result) of a process that cannot be entirely explained as a result of differences in the inputs to the process. Said another way, running the very same process multiple times using exactly the same key inputs may not (and likely will not) produce exactly the same outcomes. The differences in the outcomes are "explained" as random variation.

There is little debate that the support processes that incumbents utilize to support CLECs tend to be complex and that a variety of factors influence the quantity and quality of the support delivered. As a result, provided the necessary steps have been taken to disaggregate measurement results sufficiently to account for factors correlated with different outcomes, random variation should be accommodated. In doing so, a reasonable balance needs to be struck between (1) protecting Verizon from consequences that are a result of random variation, and (2) protecting competitors from the adverse effects of discrimination by Verizon.

As discussed above, the first step in mitigating the effects of random variation is to minimize the risk of making an incorrect decision. In this situation, the two potential incorrect decisions are (1) declaring performance compliant when it is actually discriminatory and (2) declaring performance non-compliant when it is actually within acceptable limits. If these two probabilities are balanced, then, the consequences for "false" failures conceptually offset the consequences for undetected failures. Otherwise stated, the small remedy payment by the ILEC under falsely declared non-compliance is conceptually balanced with the market losses experienced by the CLECs due to falsely declared compliance.

Some regulators have expressed concerns, in light of what they consider to be sizable consequences necessary to motivate compliant ILEC performance and the inability to precisely balance risk, that additional mitigating factors should be instituted. Unfortunately, virtually all the mechanisms discussed are designed to protect the incumbent at the expense of the protecting the competitive process. The following mechanisms have been proposed, but each suffer from serious flaws.

a. Credits for "Better than Required" Performance Permit Gaming

This approach to mitigation is misguided and has the potential to cause extreme harm with little upside potential. In this flawed approach to mitigation, consequences for failed performance could be negated if the incumbent provides "better than required" performance at a different time (or for a different measurement) and thus earns a "credit." For example, the incumbent could deliver bad performance in one area and offset the consequence through performance credits "earned" in a separate but unrelated area or through credits for compliant performance previously (or subsequently) delivered. In all cases, such credits provide incumbents extensive opportunities to "game the system." Credits give ILECs the opportunity to deliver highly variable results that swing between very good and extremely poor performance and still be absolved of any consequence. Likewise, incumbents have the opportunity to temporarily provide compliant performance and then discriminate with impunity. In either case, the CLECs' position in the marketplace compared to the incumbent is harmed. Moreover, because CLECs only learn of "better" performance after the fact (in a performance report), they cannot take practical advantage of such performance. Thus they get no benefit that offsets the real harm they and their customers have actually suffered.

b. Absolute Caps On Liability Are Unwarranted

There is no logical or practical basis to set an absolute limit on any incumbent's liability under any consequences plan, especially for Tier I type consequences. Such consequences are intended to compensate CLECs for actual harm they have sustained as a result of documented poor performance. Thus, there should never be a limit on this type of consequence. Moreover, to the extent that Tier II consequences become especially large, it may be appropriate to establish a procedural cap to provide an opportunity to assess whether the calculated consequence for an incumbent's market-affecting behavior should be limited.

Attachment F

Addressing Measurement Overlap And Correlation

Measurement overlap occurs when one or more measurements effectively measure the same performance. If two measurements overlap, then consequences should attach to only one of them. Note, however, a measurement addressing timeliness and a measurement addressing quality for the same area of performance do not overlap. Also, it should be noted that, given the care taken in defining measurements in LCUG SQM Version 7.0, there are no obvious areas of significant measurement overlap

Measurement correlation is different from measurement overlap. Measurement correlation occurs when one or more measurement results move at the same time. The direction of movement need not be the same. That is, one may improve (e.g., quality) while another deteriorates (e.g., timeliness). As such, measurement correlation does not automatically argue for adjustment to the measurements eligible for consequences. Indeed, an incumbent that is intentionally and pervasively discriminating would be capable of showing a high degree of correlation among all measurement results both within and across months – all results would be deteriorating.

If there are reasons to believe that measurements are somewhat overlapping and correlation is suspected, the solution is not to immediately eliminate one or both measurements. Rather the potentially superior approach is to create "families" for the purpose of applying consequences. Each measurement "family" would be eligible for only a single consequence. Whether and to what degree a family is eligible for a consequence would be determined by the worst performing individual measurement result within the family for the month under consideration. Thus, use of measurement families eliminates the possibility of

consequence "double jeopardy"[39] without making any advance value judgement regarding the usefulness of individual measurements.

Use of measurement families has the potential for significant harm for an otherwise effective consequence plan due because: (1) inappropriate grouping can mask areas of discrimination by placing non-overlapped measurements in the same family; and, (2) by reducing eligible measurements, without adjusting the per measurement consequence, the overall plan incentives are diminished. As a result, establishment of measurement families must be approached with extreme caution and sparingly used. At least the following conditions must be imposed.

(1) measurements that address separate support functionality may not be placed in the same family;

(2) measurements that address different modes of market entry may not be placed in the same family;

(3) measurement families may not be used as a means to avoid disaggregation detail;

(4) measurements that address (a) timeliness, (b) accuracy, and (c) completeness may not be placed within the same family;

(5) measurement families, to the extent used, must be identical across all CLECs;

(6) even if correlation can be demonstrated, measurement families must not be used to combine otherwise independent measurements of a deficient process; and,

(7) establishment of measurement families must not reduce the maximum consequence payable by more than 10% without an offsetting increase in

[39] If the measurements in the family are truly overlapping and correlated they point to the same conclusion (incidents of failure and severity). Measurement families thus treat the incumbent preferentially: either the measurements are effectively the same and only one consequence applies or they were inappropriately grouped and the incumbent avoids one or more consequences that should have been incurred.

the basic, intermediate, and severe consequence payable per failed measurement.

To the extent new measurement families are proposed or a proposal is set forth to eliminate or modify and existing family, the advocate of the change should bear the burden of demonstrating compliance with the above minimum requirements. The consideration should be in a public forum where all interested parties participate, and in the event of a disagreement, the Commission should decide based upon the record established. Prospective changes of measurement families should not affect any prior determinations regarding consequences.

No proposal to establish measurement families should be considered until the consequence plan has been operational and produced at least six months of independently verified data.

Attachment G

Graphs and Tables of Consequence Functions

The consequences as a function of performance are completely calculable from the equations presented in Tables 1,3,4, and 5 of the text. In fact using the equations in these tables directly is the appropriate way to program the computer that will perform the calculations when the plan is implemented. However, in this attachment we give graphical representations of the consequences as a function of performance and also present the functions in tabular form. The latter may be used as a less accurate alternative to the equations in the text tables to look up the consequence amounts.

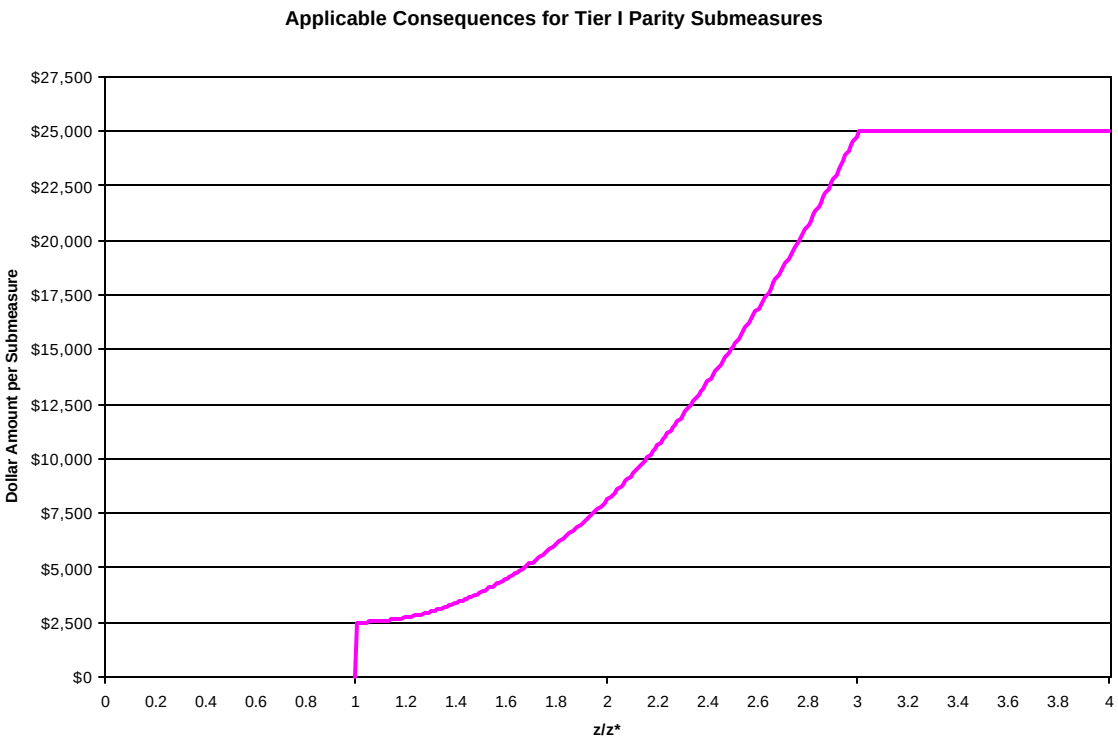
Applicable Consequences for Tier I Parity Submeasures
Dollar Amount per Submeasure
$27,500
$25,000
$22,500
$20,000
$17,500
$15,000
$12,500
$10,000
$7,500
$5,000
$2,500
$0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
z/z*

Figure G-1

Table G-1 Applicable Tier I Consequences for Parity Submeasures

z/z*	Amount
0.0 or less	$0.00
0.1	$0.00
0.2	$0.00
0.3	$0.00
0.4	$0.00
0.5	$0.00
0.6	$0.00
0.7	$0.00
0.8	$0.00
0.9	$0.00
1.0	$2,500.00
1.1	$2,556.25
1.2	$2,725.00
1.3	$3,006.25
1.4	$3,400.00
1.5	$3,906.25
1.6	$4,525.00
1.7	$5,256.25
1.8	$6,100.00
1.9	$7,056.25
2.0	$8,125.00
2.1	$9,306.25
2.2	$10,600.00
2.3	$12,006.25
2.4	$13,525.00
2.5	$15,156.25
2.6	$16,900.00
2.7	$18,756.25
2.8	$20,725.00
2.9	$22,806.25
3.0 or more	$25,000.00

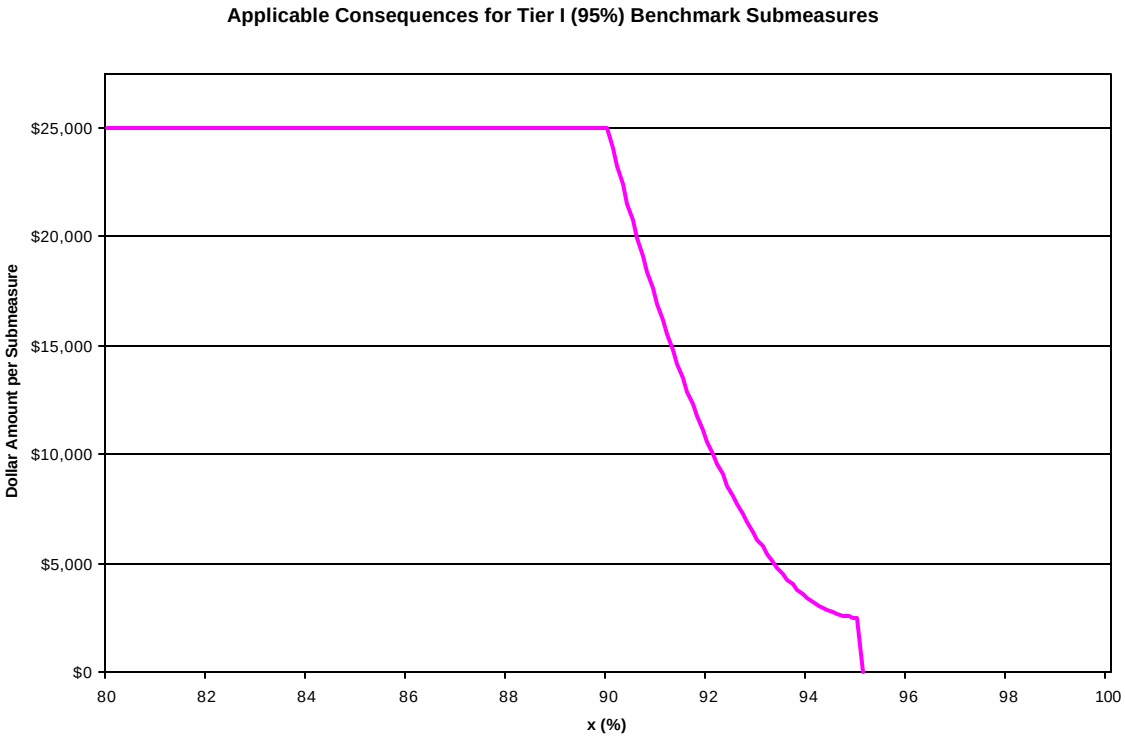
Applicable Consequences for Tier I (95%) Benchmark Submeasures
Dollar Amount per Submeasure
$25,000
$20,000
$15,000
$10,000
$5,000
$0
80
82
84
86
88
90
92
94
96
98
100
x (%)

Figure G-2

Table G-2 Applicable Tier I Consequences for (95%) Benchmark Submeasures

x (%)	Amount
90.0 or less	$25,000.00
90.5	$20,725.00
91.0	$16,900.00
91.5	$13,525.00
92.0	$10,600.00
92.5	$8,125.00
93.0	$6,100.00
93.5	$4,525.00
94.0	$3,400.00
94.5	$2,725.00
95.0	$2,500.00
95.5	$0.00
96.0	$0.00
96.5	$0.00
97.0	$0.00
97.5	$0.00
98.0	$0.00
98.5	$0.00
99.0	$0.00
99.5	$0.00
100.0	$0.00

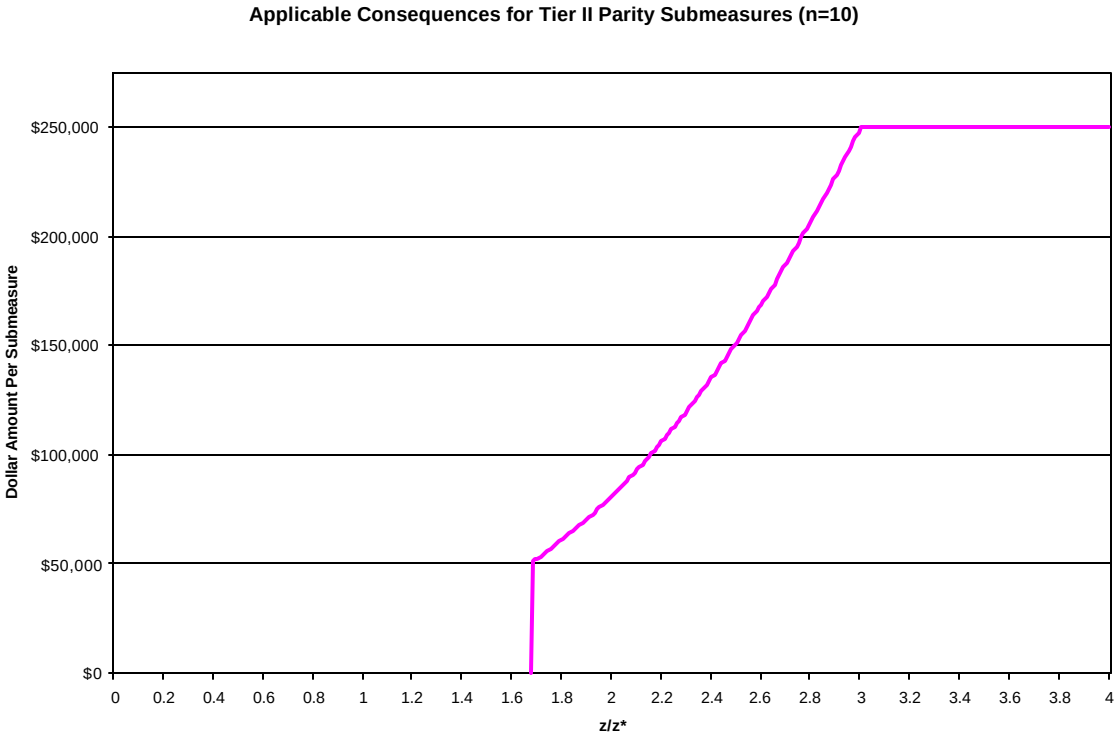
Applicable Consequences for Tier II Parity Submeasures (n=10)
Dollar Amount Per Submeasure
$250,000
$200,000
$150,000
$100,000
$50,000
$0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
z/z*

Figure G-3

Table G-3 Applicable Tier II Consequences for Parity Submeasures (n=10)

z/z*	Amount
0.0 or less	$0.00
0.1	$0.00
0.2	$0.00
0.3	$0.00
0.4	$0.00
0.5	$0.00
0.6	$0.00
0.7	$0.00
0.8	$0.00
0.9	$0.00
1.0	$0.00
1.1	$0.00
1.2	$0.00
1.3	$0.00
1.4	$0.00
1.5	$0.00
1.6	$0.00
1.7	$52,562.50
1.8	$61,000.00
1.9	$70,562.50
2.0	$81,250.00
2.1	$93,062.50
2.2	$106,000.00
2.3	$120,062.50
2.4	$135,250.00
2.5	$151,562.50
2.6	$169,000.00
2.7	$187,562.50
2.8	$207,250.00
2.9	$228,062.50
3.0 or more	$250,000.00

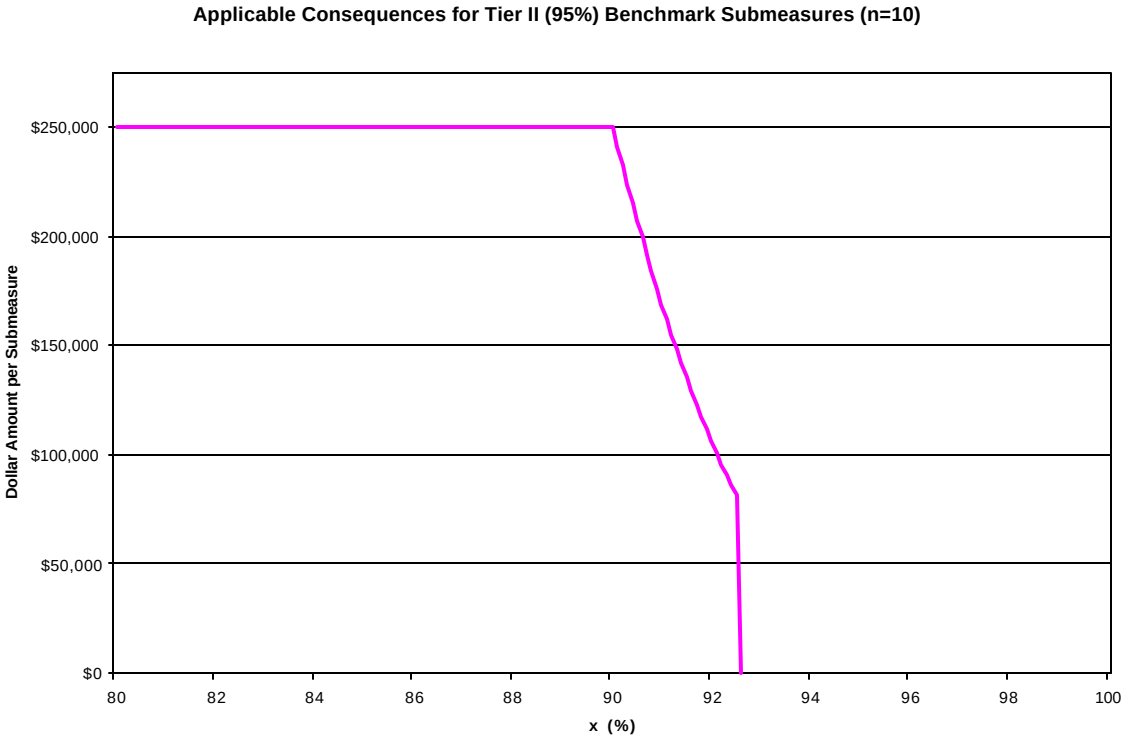
Applicable Consequences for Tier II (95%) Benchmark Submeasures (n=10)
Dollar Amount per Submeasure
$250,000
$200,000
$150,000
$100,000
$50,000
$0
80
82
84
86
88
90
92
94
96
98
100
x (%)

Figure G-4

Table G-4 Applicable Tier II Consequences for (95%) Benchmark Submeasures (n=10)

x (%)	Amount
90.0 or less	$250,000.00
90.5	$207,250.00
91.0	$169,000.00
91.5	$135,250.00
92.0	$106,000.00
92.5	$81,250.00
93.0	$0.00
93.5	$0.00
94.0	$0.00
94.5	$0.00
95.0	$0.00
95.5	$0.00
96.0	$0.00
96.5	$0.00
97.0	$0.00
97.5	$0.00
98.0	$0.00
98.5	$0.00
99.0	$0.00
99.5	$0.00
100.0	$0.00