

**Report on an Analysis of Verizon Maryland's
Proposed Revisions to the
Performance Assurance Plan**

Presented to:

The Public Service Commission of Maryland

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I. Summary

A. Purpose of this Analysis

The Public Service Commission of Maryland (“Commission”) has engaged The Liberty Consulting Group (“Liberty”) to analyze the proposed amended Performance Assurance Plan (“PAP”) that Verizon Maryland Inc. (“Verizon” or “Verizon MD”) recently filed in Maryland and to provide advice to the Commission regarding Verizon’s proposed amendments. Liberty has served the Commission in the past as auditor of the current Maryland PAP on two different occasions.¹ The Commission asked Liberty to provide a high-level analysis in a short timeframe.

B. Background

In 2003, the Commission adopted the current Maryland Performance Assurance Plan.² As noted in the PAP,

The Maryland Performance Assurance Plan (“Maryland PAP”) is a self-executing remedy plan that will ensure Verizon Maryland Inc. (“Verizon MD”) provides quality wholesale services to competitive carriers after Verizon MD has gained entry into the long distance market pursuant to Section 271 of the Telecommunications Act of 1996.³

The Maryland PAP operates through Verizon’s monitoring of specified measures of its performance in providing wholesale services to competitive local exchange carriers (“CLECs”) and rendering bill credits to these CLECs if its performance fails to meet specified standards for these measures. Verizon Inc. has similar PAPs in a number of jurisdictions within its local service operating region, including New York. One of the provisions of the Maryland PAP is that changes to the New York PAP adopted by the New York Public Service Commission (“NYPSC”) will be submitted by Verizon MD for consideration by the Commission for inclusion in the Maryland PAP.⁴

Since the Commission adopted the Maryland PAP, the competitive local telecommunications exchange market has undergone a number of substantial changes, including regulatory changes. One important set of regulatory changes are those resulting from the Federal Communications Commission’s adoption of the Triennial Review Order⁵ (“TRO”) and subsequent Triennial

¹ *Final Report on the Review of the Performance Metrics and the Associated Performance Assurance Plan Filed by Verizon Maryland*, The Liberty Consulting Group, June 24, 2004; *Final Report on the Review of Verizon’s Performance Metrics and the Associated Performance Assurance Plans*, The Liberty Consulting Group, May 1, 2006.

² *Verizon Maryland Inc. Performance Assurance Plan*, September 1, 2003. (“Maryland PAP”)

³ Maryland PAP, p. 1.

⁴ Maryland PAP, p. 24.

⁵ *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Deployment of Wireline Services Offering Advanced Telecommunications Capability, Report and Order and Order on Remand and Further Notice of*

Review Remand Order⁶ (“TRRO”). These orders have substantially changed Verizon’s obligations regarding the provision of unbundled network elements to CLECs. In particular, Verizon no longer provides such products as the Unbundled Network Elements Platform (“UNE-P”), line sharing, and line splitting as regulated services to CLECs. Many of the proposed changes to the PAP simply relate to such discontinued products. Verizon filed these changes first in New York, and the NYPSC approved a substantially revised PAP.⁷ Subsequent to the NYPSC order, Verizon filed to make largely the same amendments to the Maryland PAP.⁸ Later, Verizon filed comments in support of its proposed amendments and to propose a few minor additional changes to the Maryland PAP that had subsequently been approved by the NYPSC.⁹

C. Liberty’s Review Methods

Liberty has considerable knowledge and experience with the operation of the existing Maryland PAP based on its past audits of this PAP. Based on this knowledge and experience, Liberty reviewed Verizon’s proposed amendments and noted changes that appeared to be material. A summary of these changes is attached as Appendix A.

In addition, Liberty requested samples of past PAP reports from the Commission Staff and obtained from the Staff copies of the final PAP reports for January through October 2005, and the preliminary PAP reports for November and December 2005. Using this information and its list of material changes, Liberty analyzed the potential significance of the proposed changes and, where possible in the limited time available, quantified some of the effects. On the basis of this work, Liberty formulated recommendations to the Commission.

D. Conclusions and Recommendations

Most of Verizon’s proposed PAP revisions are justified based on the substantial changes that have occurred in the local exchange telecommunications market since the Commission adopted the current Maryland PAP. In addition, the proposed revisions make the PAP clearer and simpler. However, some of the detailed revisions have the potential for significant changes in the

Proposed Rulemaking, FCC 03-36, 18 FCC Rcd 16978 (2003) (“Triennial Review Order” or “TRO”), corrected by Errata, 18 FCC Rcd 19020 (2003).

⁶*Unbundled Access to Network Elements, Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Order on Remand*, FCC 04-290, 20 FCC Rcd 2533 (2005) (“Triennial Review Remand Order” or “TRRO”).

⁷ *Petition Filed by Bell Atlantic-New York for Approval of a Performance Assurance Plan and Change Control Assurance Plan*, filed in C97-C0271, *Order Amending Performance Assurance Plan*, Case No. 99-C-0949. (September 25, 2006) (“NYPSC PAP Order”)

⁸ *In the Matter of the Commission’s Consideration of the Maryland Carrier-to-Carrier Guidelines, Performance Standards and Reports; and the Performance Assurance Plan of Verizon Maryland Inc, Verizon Maryland Inc.’s Submission of a Revised Performance Assurance Plan* (Case No. 8916), November 21, 2006. (“Verizon PAP Amendment Filing”)

⁹ *In the Matter of the Commission’s Consideration of the Maryland Carrier-to-Carrier Guidelines, Performance Standards and Reports; and the Performance Assurance Plan of Verizon Maryland Inc, Verizon Maryland Inc.’s Comments on the November 21, 2006 Revised Maryland Performance Assurance Plan* (Case No. 8916), November 21, 2006. (“Verizon Comments”)

performance incentives that are not clearly justified. The Commission may find some of these changes desirable, but it should consider whether others make the PAP less effective and undermine the purpose of the PAP. More specifically, the proposed changes would:

- Eliminate some measures that still appear to be relevant and have triggered PAP bill credits in the recent past.
- Potentially increase the frequency of bill credits for the Mode of Entry segment of the PAP, particularly for the Loop Based entry component.
- Potentially reduce the Critical Measures bill credits for performance on the Maintenance and Repair functions and the Provisioning functions for Resale, Specials, and Trunks, while increasing bill credits for such functions as Pre-ordering, Ordering, and Billing and for Loop Provisioning.
- Potentially reduce the PAP bill credits for individual CLEC performance
- Change the scoring mechanism for performance on parity measures in a manner that will likely reduce errors unfavorable to Verizon and increase errors unfavorable to the CLECs, particularly for small sample sizes.
- Change the scoring mechanism for performance on benchmark measures in a manner that will likely reduce errors unfavorable to the CLECs while at the same time increasing errors unfavorable to Verizon, particularly for processes that are close to the benchmark.
- Create changes in the monitoring and administration of the PAP, including auditing, that the Commission may not desire.

To address these matters and prior to the approval of a revised PAP, the Commission should require Verizon to:

- Provide an explanation and justification for the specific changes in measures included in the PAP, with particular emphasis on those changes that are not directly related to the *TRO* and *TRRO*.
- Reevaluate and modify its proposed scoring mechanism to consider adjustments that would better balance the potential errors between those favorable to Verizon and those favorable to the CLECs, particularly in situations with small sample sizes.
- Reevaluate and modify its proposed changes in the mechanism for triggering Critical Measures bill credits based on performance for individual CLECs to assure that it does not substantially reduce the incentives for individual performance.
- Reevaluate and modify its proposed levels at which MOE bill credits are awarded. Liberty estimates that proposed levels may result in an increase in bill credits when Verizon's processes are above standard.

In addition, the Commission should consider its need for involvement with PAP audits and whether the proposed PAP revisions are consistent with those needs.

Section II provides the details supporting these conclusions and recommendations.

II. Analysis

A. General Comments

In general, Verizon's proposed amendments provide a substantial improvement over the current Maryland PAP in terms of organization, clarity, and complexity. In particular, it appropriately accounts for the substantial changes in the regulation of the local exchange telecommunications market and the impact of these changes on the range of products that Verizon provides to CLECs. In addition, it simplifies the operation of the PAP by making it dependent on only a single month's results, as opposed to results from multiple months as in the current PAP. However, Verizon also included some changes for which Liberty is unable to find a justification. In some cases, these changes may have a detrimental effect on the operation of the PAP. Liberty addresses these specific changes below.

Verizon noted that its proposed revisions represent a "fully integrated document" and should not be addressed in a piecemeal fashion.¹⁰ Indeed, it is the case that because of the balancing aspects of the proposed changes, one must be careful that any adjustments to this proposal be considered carefully. However, Liberty's analysis suggests there are significant issues associated with some of the proposed changes that require the consideration of such careful adjustments.

B. Analysis of Specific Maryland PAP Changes

The following sections describe certain changes to the Maryland PAP that Liberty considers to be potentially significant.

1. Elimination of Special Provisions and Change Control Assurance

The current Maryland PAP contains four major parts: a Mode of Entry segment, a Critical Measures segment, a Special Provisions segment, and a Change Control Assurance Plan. The Mode of Entry segment assesses Verizon's performance in aggregate across all CLECs for each method or mode by which carriers can enter the local exchange market. The Critical Measures segment assesses Verizon's performance on certain measures that address performance on functions deemed to be particularly important for the provision of quality wholesale services. (The Mode of Entry and Critical Measures segments are described more fully in the following sections.) The Special Provisions segment assesses Verizon's performance in a few key functional areas that were considered particularly key at the time the Commission adopted the PAP. These include flow-through, order processing confirmations and rejections, and hot cuts. The Change Control Assurance Plan is a special PAP component that assesses Verizon's performance in implementing revisions to the Operating Support System interfaces and business rules that CLECs use for wholesale transactions.

¹⁰ Verizon Comments at 6-7/

Verizon is proposing the elimination of both the Special Provisions segment and the Change Control Assurance Plan. Verizon notes¹¹ that the removal of these sections will simplify the PAP and that the most important measures in these sections are included in the Mode of Entry and Critical Measures segments and thus will continue to provide it with incentive for performance in the areas they cover. Verizon also quotes the NYPSC as concluding that the need for these sections of the PAP no longer exists.¹²

Liberty considered the impact of eliminating the Special Provisions and Change Control sections of the PAP, and concluded that their elimination appears to be sensible and justifiable. Liberty agrees with Verizon that the exclusion of these sections will help to simplify the PAP. Furthermore, based on the PAP reports for 2005, it appears there were no bill credits during this period resulting from the Special Provisions and Change Control sections of the PAP. Most of the Special Provisions measures are also part of the Mode of Entry and Critical Measures segments, and would continue to be included in these segments under Verizon's proposed revisions. Liberty does note, however, that the flow-through measures are only included in the Mode of Entry segment and that the mechanism for triggering bill credits for this segment requires aggregation across a large number of measures. The total dollars at risk associated with these measures is also reduced. As a result, the impact of deterioration in performance of these measures would likely be reduced. Furthermore, only one of the current Change Control measures (PO-4-01, % Change Management Notices Sent on Time) would continue to be included in the PAP under Verizon's proposal, but it would be included as one of the Critical Measures. Nevertheless, on balance, Liberty believes that Verizon's proposed changes are justifiable and helpful.

2. Mode of Entry Changes

The Mode of Entry segment is used to assess Verizon's performance in aggregate across all CLECs for each method or mode by which carriers can enter the local exchange market. The current PAP specifies five different modes of entry: Resale, UNE-P, UNE-Loop, Interconnection Trunks ("Trunks"), and Digital Subscriber Line ("DSL"). The PAP provides for bill credits based on a weighted average of performance for all CLECs on a set of measures chosen to represent performance in each of the five modes of entry. Given the *TRO* and *TRRO* changes, the nature of the entry modes is substantially changed. UNE-P no longer exists as a regulated entry mode and the options available under UNE-Loop and DSL have changed substantially with, for example, the elimination of line sharing and line splitting. Verizon's proposed PAP revisions would reduce the five modes to three: Loop-Based, Resale-POTS, and Interconnection Trunks. The Resale-POTS and Interconnection Trunks modes in the proposed revised PAP are substantially the same as the Resale and Interconnection Trunks modes of the current PAP, although with some change in the included measures. The Loop-Based mode is basically a combination of the current UNE-Loop and DSL modes but with a substantially reduced number of measures. The main reason for this reduction in measures is the elimination of such products as line sharing and line splitting. However, some of the changes are not clearly related to the impact of the *TRO* and *TRRO* or other changes in the telecommunications market. Liberty discusses the impact of changes in the included measures in section II.5 below.

¹¹ *Verizon Comments*, at 12-13.

¹² *NYPSC PAP Order*, at 25-26.

As noted in the current PAP,¹³ “The MOE segment measures the overall level of service.” Thus, these measures are designed to ensure performance across a number of measures within a given category. Verizon scores each measure and then computes a weighted average of the measures to determine an overall score for each category. If this overall weighted score is too low, Verizon is required to render billing credits to CLECs, beginning at 20% of a pre-defined monthly maximum and increasing to 100% of that maximum.

In Verizon's proposed revised PAP, the upper threshold for which the weighted scores trigger a bill credit¹⁴ is raised, thus allowing for bill credits for scores that are not as poor as the current PAP. To compensate for this change, the size of the bill credit at the threshold is reduced, beginning at 10% of the maximum level, rather than the current 20%. The point at which the maximum bill credit is assessed remains the same in the new proposed PAP as it is in the current PAP. However, because the method for scoring each measure, the number of measures, and the associated weights for each measure changed in the new proposed PAP versus the old PAP, it is not immediately clear what effect these changes to the threshold and minimum bill credit percentage will have on bill credits.

In order to understand the nature of bill credits paid in the past, Liberty used the PAP reports provided by Commission Staff for January through December 2005.¹⁵ These reports indicate that there was only one MOE-triggered bill credit during 2005. This bill credit was for July performance in the Resale category, and amounted to \$93,805, which is about 10% of the total 2005 bill credits. It resulted from failing scores for nine individual measures. Of these, seven were maintenance and repair (“M&R”) measures requiring a parity comparison.

Liberty does not believe that this one MOE-triggered bill credit during 2005 (out of a possible 48) can be used to draw definitive conclusions about the likely impact of the proposed changes on MOE-triggered bill credits. However, Verizon's performance during 2005 does suggest that MOE failures are rare. From a review of the data for the benchmark measures for 2005, it appears that Verizon is frequently exceeding the standards. In addition, even for Resale in July 2005, most of the measures received passing performance scores.¹⁶ On the other hand, MOE-triggered bill credits tend to be large; thus even one additional failure could result in a substantial increase in overall bill credits.

Using the current and proposed PAPs, Liberty calculated the probability of paying at least the minimum level of bill credits, given the 2005 level of performance in the future. To estimate future performance under the current PAP, Liberty calculated, for each category, how far above or below exact parity Verizon performed in 2005. For example, in 2005 for the Loop category, Verizon would have scored a weighted score average of -0.04 in a month in which the processes associated with each measure were in exact parity or exactly at the benchmark. In fact, Verizon's

¹³ Maryland PAP, p. 2.

¹⁴ This threshold is sometimes referred to as the lower boundary of the “dead band.”

¹⁵ For November and December 2006, only preliminary reports were available, but the MOE scores cannot get worse between the preliminary and final reports, so the conclusion that no bill credits were made in those months for MOE will not change with the final PAP reports.

¹⁶ Although the performance scores would be lower, due to the new scoring methodology.

2005 average exceeded this and was at -0.01 on average for 2005. The cutoff for minimum bill credits for Loop is -0.25. Given the inherent statistical variation, Liberty calculated that Verizon would pay bill credits 1% of the time if it maintains its current level of performance.¹⁷

The following table summarizes Liberty's analysis of the MOE payment rates for the current and proposed PAP, given current levels of performance by Verizon.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
PAP version	Category	Expected Score at Exact Standard	Verizon expected score given current performance	Lower Cutoff for minimum bill credits	Cutoff for 20% bill credits¹⁸	Chance of paying at least minimum bill credits	Chance of paying at least 20% bill credits
Current	Loop	-0.04	-0.01	-0.25	-0.25	1%	1%
Current	DSL	-0.18	-0.02	-0.23	-0.23	0%	0%
Current	Resale	-0.18	-0.07	-0.25	-0.25	2%	2%
Current	Trunks	-0.20	-0.01	-0.21	-0.21	5%	5%
Proposed	Loop	-0.22	-0.14	-0.12	-0.17	67%	31%
Proposed	Resale	-0.16	-0.07	-0.13	-0.19	16%	3%
Proposed	Trunks	-0.24	-0.05	-0.18	-0.27	14%	3%

In the above table, Column 3 shows the expected weighted score for the category, given the scoring rules and measures in the category, if Verizon's processes are exactly at parity for parity measures and exactly at the benchmark for benchmark measures.¹⁹ The score in Column 3 should not, on average, exceed the cutoffs in Columns 5 and 6, because that would imply that a process which is at standard, would, on average, incur bill credits. Note that, for the current PAP, the score in Column 3 is always higher than the scores in Column 5 and Column 6, as expected. However, for the rows associated with the proposed PAP, the scores in Column 3 are lower than the cutoffs in Column 5, implying that performance at standard would, on average, incur monthly bill credits in the proposed PAP.

To explore how serious this theoretical issue might be in practice, Liberty calculated the average expected score, given Verizon's 2005 performance. In 2005, Verizon generally performed somewhat above standard, and thus incurred only one bill credit (for Resale in July 2005). Columns 7 and 8 show Verizon's chances of paying bill credits, if current performance continues at 2005 levels, for the mix of measures included in the current and proposed MOE. While these calculations take into account the different weights and different mixes of benchmark and parity

¹⁷ Because its current level of performance is above standard, this means that Verizon will be required to pay bill credits, despite the processes being above standard, 1% of the months, or, on average, less than once in 10 years.

¹⁸ For the current PAP, this cutoff is the same as the cutoff for minimum credits. For the proposed PAP it is low, because the minimum bill credit percentage for the proposed PAP is 10%.

¹⁹ Liberty discusses the scoring changes in detail Section II.6. In the analysis in this table, Liberty incorporates those scoring changes as they apply to the proposed PAP. As noted in Section II.6, the scores for benchmark measures will tend to be lower (worse for Verizon) and scores for parity measures will tend to be higher (better for Verizon) in the new proposed PAP versus the current PAP.

measures, they assume that the overall performance will be equally good overall as in the current plan.²⁰

As shown in Columns 7 and 8, for all three categories in the proposed PAP, Verizon is expected to pay bill credits a significant fraction of the time, even if they maintain their current, above-standard levels of performance overall. This fraction is especially large for Loop measures, but is above 10% for Resale and Trunks. The reason why the fraction is so large for Loop measures is that the Loop measures rely substantially more on benchmark measures, and benchmark measures tend to have significantly lower scores than parity measures in the proposed PAP.

Liberty's analysis suggests that the proposed MOE mechanism is likely to produce more MOE-triggered bill credits than the current PAP. Although this may be desirable from the point of view of the Commission, Liberty notes that it can also lead to bill credits even when Verizon maintains performance that is above standard, on average. This result arises both because the threshold for bill credits is higher and because the average score for benchmark measures is lower under the proposed PAP, and the proposed PAP is more heavily weighted toward benchmark measures.

In summary, Liberty believes that the major structural change that Verizon's proposal introduces into the MOE segment, by reducing the number of modes from five to three, is well justified. However, some of the detailed changes in the mechanism may lead to unintended consequences. Liberty recommends that the changed threshold for scores that trigger bill credits in the proposed PAP be re-examined. In addition, there are issues associated with the included measures and scoring mechanism. More details and recommendations regarding these issues are in Sections II.5 and II.6.

3. Critical Measures Changes

The Critical Measures segment of the PAP is designed to provide a specific focus on certain functions that are deemed to be particularly critical to the quality of wholesale service offerings. Thus, bill credits triggered through this segment depend on Verizon's failure to meet standards on each of a specified set of measures chosen to monitor the quality of performance for such critical functions. Of the \$950,959 in total bill credits in 2005, the Critical Measures comprised \$857,154, or about 90%. For the Critical Measures segment, bill credits are triggered based on performance for individual measures, rather than a weighted average across a set of measures, as in the MOE segment. In addition, the PAP allows for the possibility of bill credits based both on aggregate performance and individual performance. The Critical Measures bill credits based on aggregate performance in 2005 equaled \$637,355 of the \$857,154 in total Critical Measures bill

²⁰ As noted in Section II.5, the proposed PAP includes a different set of measures in each category. Liberty assumes in this analysis that performance will continue to be equally above standard for the new set of measures. Thus, for Resale in 2005, Verizon was approximately 1.4 standard deviations higher than performance at exactly the standard, on average. Liberty calculated the expected score for the proposed Resale MOE as if performance at exact standard for the new set of measures in Resale, plus 1.4 standard deviations. In the case of the Loop measures, since the proposed standard is a combination of the current PAP Loop and DSL, Liberty averaged the performance in these categories to estimate the expected performance.

credits (about 75%). The remaining \$219,799 was triggered by performance failures for individual CLECs.²¹

The principal changes Verizon has proposed for the Critical Measures segment are (1) changes of and reduction in the specific measures included as Critical Measures and (2) changes in the scoring method for determining failures that trigger bill credits for CLECs. Liberty discusses the details of the changes in included measures and issues associated with the scoring mechanism in Sections II.5 and II.6. In this section, Liberty discusses the overall impact of the changes in the Critical Measures segment. Because the mechanisms for triggering bill credits are different for aggregate CLEC and individual CLEC performance, the discussion is divided into these two subsections.

The Aggregate Performance PAP Mechanism

As discussed in Section II.6 on the proposed scoring changes, Verizon's proposed PAP always assigns a score at least as low (*i.e.*, poor) as the current plan for the benchmark measures. Conversely, the proposed PAP always assigns a score at least as high (*i.e.*, good) as the current plan for the parity measures.

The overall effect of the scoring changes depends in large part upon how Verizon performs in benchmark versus parity measures. Liberty reviewed the bill credits for 2005, and found that there were 15 bill credits for parity measures and four for the benchmark measures. Under the new plan for scoring, for the same performance and the same set of Critical Measures, there would have been 12 bill credits for parity measures and nine bill credits for Benchmark measures.²² Despite the higher number of bill credits overall, several of the performance scores for the parity measures would have changed from -2 to -1, resulting in lower bill credits. The following table shows a summary of the Critical Measures payment frequency for 2005, for the actual (current) and proposed PAP plans.

²¹ November and December 2005 reports were preliminary, and do not include credits based on individual CLEC performance. Thus, the bill credits associated with individual CLEC performance are almost certainly higher than the \$219,799 reported here, since the other 10 months in 2005 all had bill credits associated with individual CLECs. Conversely, Critical Measures aggregate scores could *fall*, but only by as much as \$7,505, based on the preliminary bill credits that were provisional in November and December.

²² See section 5 for a discussion of the substantial changes in the Critical Measures.

Number of Measures Triggering Bill Credits During 2005 Based on Aggregate Results

Month	Current PAP		Proposed PAP		Comment
	Parity	Benchmark	Parity	Benchmark	
Jan 2005	2	1	2	2	Parity scores changed from -2 in current PAP to -1 for proposed PAP
Feb 2005	3	0	2	0	Parity scores changed from -2 in current PAP to -1 for proposed PAP
Mar 2005	2	0	2	0	One of the parity scores changed from -2 in current PAP to -1 for proposed PAP
Apr 2005	0	0	0	0	
May 2005	0	0	0	0	
Jun 2005	1	1	1	2	The parity score changed from -2 in current PAP to -1 for proposed PAP
Jul 2005	1	1	1	3	The parity score changed from -2 in current PAP to -1 for proposed PAP
Aug 2005	2	0	2	0	The parity scores changed from -2 in current PAP to -1 for proposed PAP
Sep 2005	1	1	1	1	
Oct 2005	1	0	1	1	The parity score changed from -2 in current PAP to -1 for proposed PAP
Nov 2005	1	0	0	0	
Dec 2005	1	0	0	0	December was provisional for current PAP
Total 2005	15	4	12	9	

Because parity scores will always be higher (or equally high) under the proposed plan and benchmark scores will always be lower (or equally low), the effect on future Critical Measures bill credits rests on Verizon's performance in these two arenas (and the relative number of Critical Measures in each). In terms of dollars at risk, the allocation in the proposed PAP has more potential bill credits allocated to benchmark measures (57% of the \$2.3 million available on a monthly basis is for benchmark measures). In the current PAP, the allocation of dollars favors parity measures (approximately 70% of the \$4 million is allocated to parity measures).²³ The net effect of these scoring and measure changes appears to be a shift in incentives from those based on parity measures to those based on benchmark measures.

The Individual Performance PAP Mechanism

The Individual bill credit scoring in the current PAP is the same as the aggregate scoring, but in order to induce a bill credit, a negative score (either -1 or -2) must occur for 2 consecutive months. In the proposed PAP, a score of -3 must occur for a single month. As described in the scoring section, this score corresponds to a Z-score of -4.935 or below for parity measures. For benchmark measures with a 95% standard, this corresponds to performance below 85%. These standards, especially for the parity measures, make it far more difficult to achieve a failing score. However, the score only needs to be maintained for 1 month (rather than 2, as previously). In effect, Verizon's proposed changes shift the mechanism for triggering bill credits from one that

²³ These totals do not include UNE-Platform measures.

results from consistently poor performance for a single CLEC below a minimum threshold to one that results from significantly poor performance for that CLEC in one month.

Using the 2005 PAP reports provided by the Commission Staff, Liberty analyzed which of the actual individual bill credits would have remained bill credits under the new scoring system. It was not possible to determine whether some measures with no bill credits would have been failures in the proposed plan (due to a poor score for only one month).²⁴ The following table summarizes the differences in the current versus the proposed plan.

**Number of Measures Triggering Bill Credits
During 2005 Based on Individual Results**

Month	Current PAP		Proposed PAP	
	Parity	Benchmark	Parity	Benchmark
Jan 2005	7	24	0	12
Feb 2005	8	3	0	3
Mar 2005	7	18	0	5
Apr 2005	12	19	0	2
May 2005	6	3	0	0
Jun 2005	10	5	0	0
Jul 2005	4	4	0	3
Aug 2005	5	21	2	3
Sep 2005	11	1	0	0
Oct 2005	1	2	0	0
Nov 2005	NA	NA	NA	NA
Dec 2005	NA	NA	NA	NA
Total 2005	71	100	2	28

As shown in the table, there would be likely be a substantial reduction in bill credits triggered by performance for individual CLECs under Verizon's proposed plan. For the 2005 results, all but two of the bill credits triggered by parity measures would not have been made under the new proposed standards, while only 28 of the 100 benchmark measure bill credits would have been made. Although it is possible that some additional bill credits would have been made under the proposed PAP because only one month of poor performance is required for payment (versus two in the current PAP), the analysis in Section II.6 that discusses the proposed scoring changes suggests that, given the same CLEC sample size and a below standard process, the proposed PAP would award bill credits far less frequently.²⁵

In summary, Liberty's analysis suggests that the proposed changes in the Critical Measures segment of the Maryland PAP will likely produce substantial changes in the nature of the incentives and in ways that are unrelated to the principal rationale for the changes, namely, the regulatory changes produced by the *TRO* and *TRRO*. For one thing, there will likely be a

²⁴ In addition, Liberty is unable, or course, to estimate the effect of Verizon's introduction of a few new measures to the Critical Measures category.

²⁵ Liberty could not determine the magnitude of these possible additional bill credits because the necessary data does not exist in the aggregate PAP reports the Commission Staff provided.

significant change in the performance incentives from an emphasis on parity measures to one on benchmark measures. Although this may appear to be merely a technical issue, most M&R measures and Provisioning measures for Resale, Specials, and Trunks are parity measures while most Pre-ordering, Ordering, and Billing and Loop Provisioning measures are benchmark measures, which implies that the proposed changes will likely result in a subtle shift in the performance incentives. Secondly, although the changes in the individual performance mechanism appear to be driven at least in part by the laudable goal of simplifying the PAP by allowing it to depend on only one month's performance rather than that of multiple months, it appears that the specific nature of the proposed changes would likely result in a substantial reduction in bill credits resulting from poor performance for individual CLECs. The sections below provide a discussion of this effect and the additional impact of the changes in the included measures. In addition, in the scoring section below, Liberty recommends changing the standards for bill credits for individual measures, in order that poor performance on an individual basis continues to result in bill credits.

4. Dollars at Risk

One of the most apparent changes in Verizon's proposal is the reduction of the dollars at risk. The proposed PAP revisions would reduce the maximum dollars at risk from \$160.67 million to \$50.5 million. Approximately \$24 million of this reduction results from the elimination of the Special Provisions and Change Control portions of the PAP. Regarding the remaining reductions, Verizon has noted that the total dollars at risk have been reduced mainly because of the reduction in services subject to the PAP²⁶ and that the NYPSC has concurred in this change and has concluded that net financial incentives would be roughly the same as the current PAP.²⁷ Verizon also notes that the changes would also increase the dollars at risk for the Specials and Other categories of Critical Measures and the actual Critical Measures dollars at risk per measure would increase somewhat.²⁸

Liberty believes that Verizon's arguments regarding the changes in the dollars at risk are reasonable. Generally, the bill credits that the PAP mechanisms trigger in a given month are a very small proportion of the total dollars at risk. Thus, the dollars at risk per measure is probably a more accurate measure of the actual performance incentives that the PAP provides, and, as Verizon notes, in some cases these are increased in the proposed revisions. Liberty believes that some of the other proposed changes, which may have the effect of changing the probability of triggering bill credits and redistributing the dollars at risk, are much more significant.²⁹ Thus, Liberty recommends that the Commission accept Verizon's proposal regarding the reduction in overall total dollars at risk and concentrate on other, more subtle, changes that Verizon's proposal might produce.

²⁶ *Verizon Comments* at 6.

²⁷ *NYPSC PAP Order* at 14-16 and 18.

²⁸ *Verizon Comments* at 10.

²⁹ Liberty discusses these other changes in other sections of this report.

5. Changes in Measures Included in the PAP

As noted above, one of the significant changes in Verizon's proposed PAP revisions involves the specific measures included in the MOE and Critical Measures segments. A significant portion of these changes appear to the result from the regulatory changes produced by the *TRO* and *TRRO*, which have led to the elimination of a number of regulated products. It is certainly sensible to eliminate from the PAP those sub-measures specifically designed to measure performance for eliminated products. However, Liberty notes that there are a number of Verizon's proposed changes in the PAP measures that appear to have no relation to these regulatory changes. Indeed, Verizon notes in its *Comments* that the proposed revisions remove "some existing metrics that have been found not to be sufficiently valuable in measuring Verizon MD's performance to merit inclusion in the MD PAP."³⁰ It is not immediately obvious that this is the case.

There are three types of such removals: (1) complete removal of measures from one or both of the remaining PAP segments, (2) removal of one or more but not all sub-measures of a measure, and (3) replacement of measures by similar measures.

An example of the first type of change is removal of all sub-measures of the measure MR-5-01, % Repeat Trouble Reports within 30 Days from the Critical Measures segment.³¹ In at least one case during 2005, failure of Verizon to meet the standard for this measure for Specials triggered bill credits. Although Verizon's proposed revisions do retain this measure in the MOE segment, the mechanism for triggering bill credits in the MOE segment is based on aggregation across a large number of measures, thereby diluting the impact of failure in any one measure. Indeed, for the same month that MR-5-01 triggered bill credits through the Critical Measures segment, the MOE segment triggered no bill credits.

An example of the second type of change is the removal from the Critical Measures of the Specials sub-measure of OR-1-04, % One Time LSRC/ASRC – No Facility Check (Electronic – No Flow-through), although Resale and Loop sub-measures of the same metric are retained. In at least one case during 2005, this Specials OR-1-04 sub-measure triggered a Critical Measures bill credit. Thus, it is unclear why the OR-1-04 sub-measure is deemed to retain its value as a monitor of Resale and Loop performance but not Specials performance.

Finally, an example of the third type of proposed change is the replacement of the Critical Measures BI-3-04 (% CLEC Billing Claims Acknowledged within 2 Business Days) and BI-3-05 (% CLEC Billing Claims Resolved within 28 Calendar Days after Acknowledgement) by the measure BI-9-01 (% Billing Completeness in Twelve Billing Cycles). Both BI-3-04 and BI-3-05 triggered bill credits through the Critical Measures PAP mechanism during 2005. Although BI-9-01 addresses similar issues of billing performance, it does not measure the exactly the same aspects of the billing process.

These are only some examples of the numerous changes in measures that Verizon proposes. It is quite possible that there are compelling reasons why these changes are advisable. However, Liberty is not aware that Verizon has provided those reasons to the Commission. Therefore,

³⁰ *Verizon Comments* at 5.

³¹ Another example is the elimination of all the Enhanced Extended Loop (EEL) measures.

Liberty recommends that before approving these changes, the Commission request an explanation for all the various changes in measures involved in its proposed PAP revisions.

6. Performance Scoring

One of the major changes in the proposed PAP is a revision of the method of scoring Verizon's performance. These changes can have a major impact, since Verizon uses the performance scores to trigger bill credits. Changes in scoring apply to both MOE and Critical Measures, and, for Critical Measures, affect bill credits based on both aggregate and individual CLEC results. For the purposes of scoring, the measures fall into two broad categories: benchmark measures, where the scoring is according to an absolute standard and is non-statistical; and parity measures, where the scoring is based on comparing CLEC and ILEC performance using a statistical test.

For both benchmark and parity measures, Liberty analyzed the scoring changes in terms of two possible types of errors that can be made in scoring the PAP. The first type of error occurs when Verizon's underlying process is at or above standard (in parity for parity measures or at benchmark for benchmark measures). It is possible that, despite a process that is at standard, the scoring mechanism assigns a score that results in bill credits. This is called a Type I error, and is a type of error that is unfavorable to Verizon. The second type of error can only occur when Verizon's underlying process is below standard (below parity for parity measures or below benchmark for benchmark measures). It is possible that, despite a process that is below standard, the scoring mechanism assigns a score that results in no bill credits. This is called a Type II error, and is a type of error that is unfavorable to the CLECs. For any given sample size, these two types of errors move in reverse directions, so that a scoring methodology that increases one type of error will reduce the other type of error. Liberty reviewed the proposed PAP changes in benchmark and parity scoring to determine changes in the levels of these two types of error.

Based on the analysis described below, Liberty concluded that, for aggregate scoring of benchmark measures, the performance scores for each level of performance are at least as low in the proposed PAP as in the current PAP. This results in more situations in which a bill credit will be rewarded when Verizon's underlying process is at or above benchmark (Type I error increases). On the other hand, it also results in fewer situations in which no bill credit will be rewarded when Verizon's underlying process is below benchmark (Type II error decreases).

For aggregate scoring of parity measures, the performance scores for each level of performance are at least as high in the proposed PAP as in the current PAP. This results in more situations in which no bill credit will be rewarded when Verizon's underlying process is out of parity (Type II error increases), but it results in fewer situations in which bill credits will be rewarded when Verizon's underlying process is in parity (Type I error decreases).

For scoring based on Verizon performance for individual CLECs, for both parity and benchmark measures, Liberty concludes that Type I error, where bill credits are erroneously awarded, falls nearly to 0, while Type II error, where bill credits are not awarded when Verizon's underlying process is below standard, increase substantially.

a. Benchmark Scoring

In the current PAP, Verizon scores Benchmark measures according to Table C-1 of the PAP Appendix C. For example, the table shows that for measures with a Benchmark (or “Absolute”) Standard of 95%, the PAP assigns a score of 0 if performance is at least 95%, a score of -1 if performance is less than 95% but at least 90%, and a score of -2 if performance is greater less than 90%. However, the score of -1 is provisional: when the score is -1, it changes to 0 if the score in the next two months is 0. This is sometimes referred to as the “-1 Recapture Provision.”

In Verizon’s proposed PAP revisions, the scoring would be according to Table C-2 of the proposed PAP. There are two primary differences. First, the -1 score is no longer provisional. However, the performance levels at which the scores 0, -1, and -2 scores are assigned remain the same (e.g., for a 95% benchmark, the new proposed PAP still assigns a score of 0 if performance is at least 95%, a score of -1 if performance is less than 95% but at least 90%, and a score of -2 if performance is greater less than 90%). Second, the scoring of Individual CLEC performance is according to a single standard, which is different from that of the -1 and the -2 scores for the aggregate scoring standards.

1) Aggregate Benchmark Scoring

The following table summarizes aggregate scoring for benchmarks in the new and proposed plans, with the 95% standard used as an example.

Benchmark Aggregate Scoring (using 95% Benchmark as an Example)

	Performance >=95%	Performance >90% but less than 95%	Performance below 90%
Current PAP score	0	Either -1 or 0, depending on future performance	-2
Proposed PAP score	0	-1	-2

As shown in the table, the proposed revised PAP gives a -1 for performance in the 90-95% range, rather than using a provisional score that can revert to 0 based on future performance. Thus, in the proposed PAP, for a Critical Measures benchmark measure with a 95% standard, all performance between 90 and 95% results in bill credits, whereas in the current plan, such performance may not result in bill credits if the following two months performance is at or above 95%.

In both the current and the proposed PAP, if Verizon maintained a performance level that achieves the benchmark on average, there would still be instances where their performance scores would be below 0 for a given month (and thus subject to bill credits), simply due to random variation. Conversely, if Verizon maintained a process that is below the benchmark on

average, there would still be instances where their performance scores would be 0, and they would pay no bill credits, simply due to random variation in the month at issue.³²

Liberty analyzed the rates of such errors, as a function of CLEC sample size and performance. Because the scoring for -2 is exactly the same in the current and proposed plan, Liberty focused on error rates associated with scores of 0 and -1. In particular, Liberty calculated, for different sample sizes, the chance of Verizon receiving a -1 score when their process is at or above a 95% benchmark. Similarly, Liberty calculated the chance of Verizon receiving a score of 0 when their process is below 95%.

The following table shows the chances of a final aggregate score of -1, when in fact the score should be 0.³³ The table shows the rates at which the current and proposed scoring mechanisms produce scores of -1 at various levels of performance superior to the benchmark of 95%,

Percent of Final -1 scores in Error						
CLEC Sample Size	Process at 99% (Above Benchmark of 95%)		Process at 97.5% (Above Benchmark of 95%)		Process at 95% (Exactly at Benchmark of 95%)	
	Current PAP	Proposed PAP	Current PAP	Proposed PAP	Current PAP	Proposed PAP
50	0.04%	1.38%	3.09%	12.79%	29.85%	42.17%
100	0.00%	0.05%	0.31%	3.99%	23.12%	37.25%
250	0.00%	0.00%	0.02%	1.10%	35.30%	48.21%
500	0.00%	0.00%	0.00%	0.05%	31.04%	44.71%
1000	0.00%	0.00%	0.00%	0.00%	32.88%	46.25%
1500	0.00%	0.00%	0.00%	0.00%	33.72%	46.93%
2000	0.00%	0.00%	0.00%	0.00%	34.22%	47.34%

As seen in the table, this error rate falls as sample size increases. As such, the error rates for sample sizes greater than 500 are virtually 0 for both the current and proposed plans when Verizon’s performance is above the benchmark. Also, this error rate is lower when Verizon’s process is further above the benchmark. For example, the error rate for a sample size of 50 for the current PAP is 3.09% when the process is at 97.5% but only 0.04% when the process is at 99%.

The table also shows that the error rates for the proposed PAP are higher than those of the current PAP; that is, the proposed PAP will result in more instances where Verizon pays bill credits, even though the process is at or above benchmark. These error rates are especially high,

³² The statistical term for the first type of error, where the score indicates a failure despite a process at or above benchmark, is called *Type I error*. The rate at which this error occurs is typically denoted by the Greek letter α . The second type of error, where the score is a 0 despite a process *not* at or above benchmark, is typically called *Type II error*. The rate at which this error occurs is typically denoted by the Greek letter β .

³³ The figures in the table use “final” scores in that, for the calculations for the current plan, they take into account the fact the “-1” scores that revert to 0.

both for the current and the proposed PAP, when the process is close to or equal to the benchmark, but the error rates are significantly higher for the proposed PAP.

The next table shows the error rate for the opposite situation; that is, when Verizon is operating below the benchmark but still receives a score of 0.

Percent of 0 Scores in Error

CLEC Sample Size	Process at 92.5% (below benchmark of 95%)		Process at 87.5% (below benchmark of 95%)	
	Current PAP	Proposed PAP	Current PAP	Proposed PAP
50	30.57%	26.58%	4.24%	4.18%
100	26.49%	23.08%	1.07%	1.06%
250	6.33%	6.01%	0.00%	0.00%
500	1.69%	1.67%	0.00%	0.00%
1000	0.10%	0.10%	0.00%	0.00%
1500	0.01%	0.01%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%

In this table, the error rates are always higher for the current PAP. For the previous table, the error rate is always higher for the proposed PAP. This result is an indication of the fact, explained above, that scores for the proposed PAP are always at least as low as the scores for the current PAP.

For both types of errors (scores of 0 when the process is below benchmark and scores of -1 when the process is at or above benchmark), these error rates quickly go to zero for CLEC sample sizes above about 500.³⁴ However, many of the Critical Measures have aggregate CLEC sample sizes of less than 500. In these cases, errors will occur with some frequency, both for situations when Verizon should have paid a bill credit but received a zero score and for situations in which Verizon should have paid no bill credit but received a -1 score.

Even for small sample sizes, if the process is well above or well below parity, error rates are small. However, Liberty concludes that the changes to aggregate scoring do make Critical Measures bill credits more likely for benchmark measures, but not significantly more likely unless Verizon is operating near the benchmark. If Verizon is operating near the benchmark (but above), the percentage of bill credits paid in error will be nearly 50% under the proposed PAP, versus about one-third under the current PAP.

2) Individual Benchmark Scoring

³⁴ Because of the absolute, non-statistical nature of the standard, when the process is exactly at benchmark, the error rate does not fall with sample size, in either the proposed or the current PAP.

In the current PAP, the mechanism for scoring benchmark measures based on individual CLEC results is the same as that based on aggregate CLEC results. However, Critical Measures bill credits based on individual results require a negative score for two consecutive months. In addition, Verizon does not render bill credits based on individual CLEC results if they are required to render a bill credit for aggregate results on that measure for the same month. The exact amount credited per failure depends upon the performance of the CLEC and the total market volume for the measure. For a 95% standard, anything below 90% receives the maximum bill credit per failure while performance between 90 and 95% receive a reduced bill credit per failure.

In the proposed PAP, bill credits are triggered when single month performance falls below a certain threshold. As with the current plan, Verizon does not make individual bill credits if there is an aggregate bill credit for the measure in the same month. The amount paid per failure depends upon the total market volume, but the bill credit per failure is fixed beyond that (*i.e.*, it does not depend upon performance). For a 95% standard, individual bill credits are assessed for performance below 85%.

The following table summarizes individual bill credit conditions in the current and proposed PAP plans.

Individual Benchmark Bill Credit Conditions				
	Performance >=95%	Performance >90% but less than 95%	Performance >85% but less than 90%	Performance below 85%
Current PAP	No Bill credit	Partial bill credit or no bill credit, depending on prior month performance	Full bill credit or no bill credit, depending on prior month performance	Full bill credit or no bill credit, depending on prior month performance
New Proposed PAP	No Bill credit	No Bill credit	No Bill credit	Full bill credit

In the current PAP, any performance below 95% could result in a bill credit, if the prior month also had poor performance. However, in the current PAP, performance below 85% could result in no bill credit if the prior month performance was good enough. Conversely, in the proposed PAP, all performance below 85% in the current month results in a bill credit, whereas no performance above 85% results in a bill credit.

As with the aggregate scoring, we next explored how frequently the rules in the current and prior PAPs would result in an error. In all cases, we assumed that aggregate performance was not below standard, since otherwise individual bill credits are not allowed in either the current or proposed PAP. As with the aggregate scoring error calculations, we first assumed that the process produces results at 97.5% or 99%, both for a 95% benchmark standard, and calculated the frequency with which Verizon is required to pay a bill credit.

Percent Individual Bill Credits Made in Error

Sample Size	Process at 97.5% (Above Benchmark of 95%)		Process at 95% (Exactly at Benchmark of 95%)	
	Current PAP	Proposed PAP	Current PAP	Proposed PAP
50	0.11%	0.00%	11.31%	0.32%
100	0.00%	0.00%	5.89%	0.00%
250	0.00%	0.00%	12.49%	0.00%
500	0.00%	0.00%	9.63%	0.00%
1000	0.00%	0.00%	10.81%	0.00%
1500	0.00%	0.00%	11.37%	0.00%
2000	0.00%	0.00%	11.71%	0.00%

As can be seen from the table, neither the current nor the proposed PAP results in any substantial number of bill credits paid in error for a process operating at 97.5%. On the other hand, if the process is exactly at benchmark, bill credits will be erroneously paid in a substantial number of circumstances for the current PAP. The proposed PAP continues to have virtually no bill credits paid in error. This difference is due to the fact that the proposed PAP requires Verizon's performance to be much further below the standard level of performance before bill credits are triggered, and this requirement outweighs the fact that, in the current PAP, poor performance must continue for two months before Verizon must render bill credits.

Liberty also analyzed the opposite situation: namely, the chances that Verizon will be required to pay no individual bill credits when the process is below benchmark. The following table summarizes those results.

**Percent Individual Bill Credits Not Made
When Service Was Substandard**

Sample Size	Process at 92.5% (Above Benchmark of 95%)		Process at 82.5% (Above Benchmark of 95%)	
	Current PAP	Proposed PAP	Current PAP	Proposed PAP
50	51.80%	96.84%	0.89%	33.29%
100	45.96%	99.69%	0.04%	30.68%
250	12.26%	100.00%	0.00%	14.86%
500	3.36%	100.00%	0.00%	7.69%
1000	0.20%	100.00%	0.00%	1.92%
1500	0.01%	100.00%	0.00%	0.53%
2000	0.00%	100.00%	0.00%	0.15%

In these cases, the error rate of the proposed plan is always higher.³⁵ As discussed at the beginning of this section, a lower error rate for not erroneously awarding bill credits (when the process is at benchmark) is traded off against a higher error rate for erroneously not paying bill credits for a process that is below benchmark. In the case of bill credits based on Verizon performance for individual CLECs, the proposed PAP makes one error rate very small only at the expense of making the second error rate very high.

b. Parity Scoring

In the current PAP, Verizon scores parity measures using a statistical test. In most cases, this test is a slight variation of the standard t-test, but allows for a permutation test when the CLEC sample size is less than 30.³⁶ In either case, the statistical test produces a result called a Z-score, which shows, in a standardized way, how far the CLEC data is from parity. According to the current PAP plan, if the Z-score is greater than or equal to -0.8225, Verizon assigns a score of 0. If the Z-score is between -0.8225 and -1.645, Verizon assigns a score of -1. If the Z-score is less than -1.645, Verizon assigns a score of -2. As with the Benchmark scoring, scores of -1 are provisional, and revert to 0 if the measure receives a score of 0 the following two months.

In the new proposed PAP plan, scoring of parity measures uses a permutation test, regardless of sample size. If the Z-score is greater than -1.645, Verizon assigns a score of 0. For a Z-score less than -1.645 but greater than -3.290, Verizon assigns a score of -1, and if the score is less than -3.290, Verizon assigns a score of -2. In addition, Verizon assigns a score -3, when the Z-score for individual CLEC performance is below -4.935.³⁷ As with the benchmark scoring, scores of -1 are no longer provisional.

It may superficially appear that the proposed changes double the required severity level of a failure before assigning a negative score, double it again before assigning a score of -2, and triple it for a score of -3. In actuality the proposed revised Z-score cutoffs require a much higher level of failure, as Liberty discusses later in this section.

³⁵ The fact that the proposed PAP has a higher error rate in generating appropriate bill credits when performance is below standard and a lower error rate when performance is above standard, implies that, overall, the proposed PAP would make it more difficult (require much poorer performance) to trigger bill credits for benchmark measures based on individual CLEC performance. Thus, for a standard of 95%, the lower cutoff of 85% in the proposed PAP outweighs the fact that in the proposed PAP the poor performance only needs to occur for one month in order for Verizon to make a bill credit. The proposed PAP will almost never result in bill credits if the process is below benchmark but still significantly above the 85% individual PAP cutoff. In fact, when the process is between 85% and 95%, the error rate for the proposed PAP actually *increases* with increased sample size.

³⁶ The permutation test does not rely on the assumption that the underlying data is from a statistical distribution called the Normal distribution. When sample sizes are large, this assumption makes little difference. However, with small sample sizes, this assumption can make a difference. Thus, the permutation test is sometimes substituted for a standard t-test with small sample sizes.

³⁷ Individual CLEC performance is measured separately from Aggregate performance. Thus for each Critical measure (in both the current and new proposed PAPs), there is an Aggregate score and a score for each CLEC. In the new proposed PAP, that individual score is either 0 or -3. In the current PAP, that individual score is 0, -1, or -2.

1) Aggregate Parity Scoring

The following table summarizes the differences in Parity Aggregate Scoring, for the current PAP versus the new proposed PAP.

PAP Scoring under Current and Proposed PAPs

	Z-score > -0.8225	Z-score between -0.8225 and -1.645	Z-score between -1.645 and -3.290	Z-score < -3.290
Current PAP score	0	Either -1 or 0, depending on future performance	-2	-2
New Proposed PAP score	0	0	-1	-2

As shown in the table, the scores for the proposed PAP are either the same or higher than the scores for the existing PAP, for Parity measures. In the proposed plan, no Z-scores between -0.8225 and -1.645 will result in bill credits. In the old plan, some did. In the proposed plan, Z-scores between -1.645 and -3.290 result in bill credits less than the maximum bill credit. In the current PAP, Z-scores between -1.645 and -3.290 receive the maximum bill credit.

In either the current or proposed PAP, Verizon may receive a score of 0 for a month, even though the underlying process is below parity, simply due to random variation. Conversely, Verizon may receive a score of -1 or -2, even though the underlying process is in parity. The following table shows the error rates for a parity measure where the process is in parity or super-parity.³⁸

³⁸ Super-parity means the process gives better service given to the CLEC customers than to the ILEC's own customers.

Error Rate: Verizon Received Score of Less Than 0 When in Parity						
Sample Size	Process in Super-parity: 95% ILEC vs. 99% CLEC		Process in Super-parity: 95% ILEC vs. 97.5% CLEC		Process in Exact parity: 95% ILEC vs. 95% CLEC	
	Current PAP	Proposed PAP	Current PAP	Proposed PAP	Current PAP	Proposed PAP
50	0.00%	0.00%	0.16%	0.15%	5.07%	3.78%
100	0.00%	0.00%	0.02%	0.02%	5.21%	2.82%
250	0.00%	0.00%	0.00%	0.00%	9.57%	4.74%
500	0.00%	0.00%	0.00%	0.00%	8.76%	4.54%
1000	0.00%	0.00%	0.00%	0.00%	8.04%	3.84%
1500	0.00%	0.00%	0.00%	0.00%	9.32%	4.59%
2000	0.00%	0.00%	0.00%	0.00%	9.70%	4.78%

It is not surprising that in all cases, the error rate for receiving scores of less than 0 is lower in the proposed PAP. This stems from the fact that the scores are always at least as low in the current plan versus the proposed PAP. The only situation where the error rate is significantly different from zero in the table is when the process is exactly in parity. In that case, the current PAP has an error rate of between 5 and 10% while the proposed PAP is always less than 5%.³⁹

The second type of error that can be made is that Verizon receives a score of 0 when the process is out of parity. The following table examines the frequency of that type of error, by sample size and by the state of the process.

Error Rate: Verizon Received Score of 0 When Out of Parity							
CLEC Sample Size	Process out of parity: 95% ILEC vs. 92.5% CLEC		Process out of parity: 95% ILEC vs. 87.5% CLEC		Process out of parity: 95% ILEC vs. 82.5% CLEC		
	Current PAP	Proposed PAP	Current PAP	Proposed PAP	Current PAP	Proposed PAP	
50	74.91%	83.02%	24.34%	39.35%	4.80%	10.84%	
100	59.30%	78.33%	5.80%	18.37%	0.20%	1.27%	
250	23.46%	48.97%	0.05%	0.48%	0.00%	0.00%	
500	8.47%	25.27%	0.00%	0.00%	0.00%	0.00%	
1000	1.08%	6.37%	0.00%	0.00%	0.00%	0.00%	
1500	0.11%	1.02%	0.00%	0.00%	0.00%	0.00%	
2000	0.01%	0.16%	0.00%	0.00%	0.00%	0.00%	

In the case of erroneous scores of 0, the error rate for the proposed PAP is always higher. This once again stems from the fact that the scores are always higher (closer to 0) in the proposed PAP versus the current PAP. For processes that are slightly below parity (ILEC 95% versus

³⁹ The proposed PAP has an error rate of paying penalties when the process is in parity of no more than 5%, by definition, because the statistical standard of a Z-score of less than -1.645 imposes this condition implicitly.

CLEC of 92.5%), the error rates are substantial even for large CLEC sample sizes, and the proposed PAP results in far more errors.

2) Individual Parity Scoring

Individual scoring for parity measures is more complex than aggregate scoring. In the current PAP, individual scoring for individual and aggregate measures is the same, but a score of -1 or lower must occur for two consecutive months in order for bill credits to be assessed. In addition, as with benchmark measures, individual scores of -1 or -2 only lead to bill credits when the Critical Measures aggregate score for the same measure was 0 for the month.

The proposed PAP also contains the requirement that the aggregate score must be 0 in order for any CLEC be eligible for bill credits based on individual scoring. If this requirement is met, then performance below a Z-score of -4.935 obligates Verizon to pay a bill credit. As Liberty will explain through the tables below, performance will only dip below this Z-score in rare circumstances, unless the CLEC sample size is very large and the performance is very poor.

The following table summarizes the situations in which bill credits are paid on the basis of individual performance, in the current and proposed PAP plans.

Individual Parity Scoring				
	Z-score above - 0.8225	Z-score between -0.8225 and -1.645	Z-score between - 1.645 and -4.935	Z-score below - 4.935
Current PAP	No Bill credit	Partial bill credit or no bill credit, depending on prior month performance	Full bill credit or no bill credit, depending on prior month performance	Full bill credit or no bill credit, depending on prior month performance
New Proposed PAP	No Bill credit	No Bill credit	No Bill credit	Full bill credit

As shown, there is the possibility that at some level of monthly performance, the current plan will require a bill credit while the proposed PAP will not. Conversely, there is the possibility that at some different level of monthly performance, the current plan will not require a bill credit while the proposed PAP will.

Liberty examined the error rates for paying individual bill credits when the process was in fact in parity and for not paying individual bill credits when the process was in fact out of parity. The first table below shows the chances that individual bill credits will be made in error, given a “super-parity” condition of 95% ILEC vs. 97.5% CLEC and an exact parity condition. In both cases, the error rates are negligible, even for small sample sizes.

Error Rate: Scores Indicate Individual Bill Credits When Process is In Parity				
Sample Size	Process in super-parity: 95% ILEC vs. 97.5% CLEC		Process in exact parity: 95% ILEC vs. 95% CLEC	
	Current PAP	Proposed PAP	Current PAP	Proposed PAP
50	0.00%	0.00%	0.26%	0.00%
100	0.00%	0.00%	0.27%	0.00%
250	0.00%	0.00%	0.92%	0.00%
500	0.00%	0.00%	0.77%	0.00%
1000	0.00%	0.00%	0.65%	0.00%
1500	0.00%	0.00%	0.87%	0.00%
2000	0.00%	0.00%	0.94%	0.00%

The next table shows the chances that bill credits will not be due, despite a process that is out of parity. The table shows these error rates for three out-of-parity conditions.

Error Rate: Scores Indicate No Individual Bill Credits When Process is Out of Parity						
Sample Size	Process below parity: 95% ILEC vs. 92.5% CLEC		Process below parity: 95% ILEC vs. 87.5% CLEC		Process below parity: 95% ILEC vs. 82.5% CLEC	
	Current PAP	Proposed PAP	Current PAP	Proposed PAP	Current PAP	Proposed PAP
50	93.71%	100.00%	42.75%	99.74%	9.37%	95.57%
100	83.43%	100.00%	11.27%	97.80%	0.41%	70.77%
250	41.42%	99.94%	0.11%	67.35%	0.00%	4.04%
500	16.22%	99.26%	0.00%	8.57%	0.00%	0.00%
1000	2.15%	93.08%	0.00%	0.01%	0.00%	0.00%
1500	0.22%	78.51%	0.00%	0.00%	0.00%	0.00%
2000	0.02%	55.53%	0.00%	0.00%	0.00%	0.00%

As shown in the table, the proposed PAP has extremely high error rates for small to moderate sample sizes. For example, even when the CLEC process is at 82.5% versus an ILEC process at 95%, the statistical tests will result in no bill credits (for a sample size of 100) 70.77% of the time. This is in contrast to a 0.41% error rate for the current PAP under the same conditions.

With the standard of -4.935, performance needs to be very poor in order for bill credits to be triggered. As explained in the introduction to this section, there is a trade-off, for any given sample size, between the error rate for paying bill credits when a process is in parity and the

error rate for not paying bill credits when a process is out of parity. In other words, it is only possible to reduce one error rate by increasing the other. A Z-score of -4.935 reduces the error rate for awarding bill credits when the process is in parity to nearly 0 (0.0000401%). The cost of this infinitesimally small error rate for paying bill credits when the process is in parity is that the error rate for not paying bill credits when the process is out of parity is high. It is possible to have small error rates for both types of errors only when sample sizes are very large.

3) Proposed Z-Score Cutoff Changes

Although it may superficially appear that the proposed changes in the Z-score cutoffs for scoring would double the required severity of a failure for the same score, in the case of aggregated scores, and triple the severity of a failure required for triggering bill credits for poor performance for individual CLECs, the actual requirement is much more extreme. In fact, the error associated with a Z-score of -3.290 is not half the error associated with a Z-score of -1.645; likewise a Z-score of -4.935 does not ensure an error rate one-third that of -1.645. At exact parity, the following table shows the error rates of the three Z-score levels, along with two additional potential Z-score cutoffs that may be more along the lines of the intended error rates.

Standard	Percent Error for process at exact parity	Average number of measurements before first error
-1.645	5.00%	20
-3.290	0.05%	1,996
-4.935	0.00%	2,495,297
-1.960	2.50%	40
-2.325	1.00%	100

As shown, the current PAP standard of -1.645 for a -2 score produces an error rate of 5% for a process that is in exact parity, meaning an error will occur once in 20 measurements. The proposed PAP standard of -3.29 for a -2 score produces an error rate of 0.05%, or once in every 1,996 measurements.⁴⁰ The new standard for individual measures of -4.935 produces an error only once for every 2.5 million measurements. The cost of this tiny error rate is that the error rate for not assessing bill credits for processes that are below parity is very high.

c. Summary and Conclusions Regarding Scoring

Verizon’s proposed changes in the mechanism for scoring performance failures is likely to have subtle but significant impacts on the bill credits and hence the incentives of the PAP. While the proposal does have the virtue of removing the dependence on more than one month’s performance, the additional changes proposed as an apparent compensation for this change appear to lead to significant and perhaps unintended consequences.

⁴⁰ Again assuming the process is in exact parity. This assumption produces the *highest* possible error rate for obtaining below 0 scores when the process is in parity or super-parity.

The proposed scoring changes would likely have the most significant impact on Critical Measures bill credits triggered by poor performance for individual CLECs, in many cases drastically reducing the probability for such bill credits, regardless of whether those bill credits are triggered by parity or benchmark measures. In effect, what Verizon's proposal does is reduce to almost zero the currently low probability that the PAP will require a bill credit when Verizon's process is at or above standard (either parity or benchmark) while at the same time significantly increasing the probability that the PAP will not require a bill credit even when Verizon's performance is far below standard. This higher error rate is particularly serious for measures with few observations (small sample sizes) in a given month.

For scoring based on the results for the aggregate CLEC population, which affects both MOE and Critical Measures, the results are mixed. Scores for benchmark measures will likely fall, while scores for parity measures will likely increase.

One way to remedy the problems noted with Verizon's proposal for scoring parity measures, would be to use a different set of Z-score cutoffs to determine the scores. For example, a Z-score of -2.350 appears to be a more appropriate cutoff for triggering bill credits based on individual CLEC performance. This is associated with a 1% error rate for a process that is exactly in parity, and this standard is more than triple the -1.645 standard for aggregate performance. Likewise, a standard of -1.960 for the -2 score for aggregate performance appears to be appropriate, as this is double the standard imposed by a -1.645 cutoff.

The primary problem with the proposed new benchmark scoring is that a score of -1 is now given for aggregate performance below standard, no matter how close the performance is to the standard. If, instead, scores of 0's were issued for performance slightly below benchmark (1 or 2% below), then the error rate would be reduced for erroneous bill credits without substantial effects on the error rate for erroneous scores of 0.

7. Statistical Analysis Procedures

Statistical procedures are used in both the current and proposed PAPs in order to score parity measures. In the current PAP, a variation of a standard t-test is used for CLEC sample sizes above 30, and a different procedure called a permutation test is used for sample sizes below 30. In the proposed PAP, a permutation test will be used regardless of sample size.

Liberty believes the permutation test is a desirable test for small sample sizes, and that the permutation test will not change the results in any significant way for large sample sizes. The reason that the test is desirable for small sample sizes is that the permutation test does not rely on strong assumptions about the nature of the data, as the t-test does.⁴¹ For large sample sizes,

⁴¹ Technically, the permutation test is a distribution-free test, and does not assume that the data follow any particular probability distribution. The current PAP uses the LCUG t-test, which is a variant of the standard t-test and assumes that the data follow a Normal Distribution. In the case of testing means or percentages, as with the tests required in the PAP, the distribution becomes a Normal Distribution as the sample sizes get large, and thus the LCUG t-test's assumption becomes true. The Z-scores from the LCUG t-test are computed using a t-distribution, while the Z-scores for the permutation test are computed using the empirical findings of the permutation test for the particular

statistical theory shows that these assumptions are no longer important, and permutation tests and t-tests will produce very similar results for large sample sizes. Thus, although Verizon's proposed use of permutation testing for large sample sizes is unnecessary in its complexity, it is not inappropriate.

While Liberty believes the permutation test is appropriate, especially with small sample sizes, Liberty notes a technical issue with the use of permutation tests with small sample sizes in the case where the cutoff is -4.935. This cutoff applies to individual bill credits in the proposed PAP, and this is one area where sample sizes are likely to be small. In order to achieve a permutation test result of less than -4.935 (and thus a bill credit) fewer than one in 2,495,297 of the permutation test runs must be worse than the CLEC performance. With small sample sizes, the exact permutation test may have fewer possible combinations than 2,495,297, and thus it would be impossible, no matter what the CLEC result, for an individual failure. As noted above in Section II.6, Liberty believes that the Z-score cutoff of -4.935 is inappropriate for other reasons. Thus, this issue would be obviated by changing the Z-score cutoffs in the manner that Liberty suggests in that section.

Liberty also recommends considering the complete removal of the small sample size requirements. The use of the permutation test allows testing without assumption violations for any sample size without elevation of error levels for awarding bill credits (only the error level for not awarding bill credits will grow, but less so than when small sample sizes are totally excluded). For very small sample sizes, the test will not produce results requiring bill credits.

8. Audits

The current Maryland PAP provides for an annual audit of "Verizon's data and reporting."⁴² These audits are to "be performed, at the Commission's discretion, by either the Commission Staff or an independent auditor, selected by the Commission and paid for by Verizon."⁴³ Verizon's proposed revisions to the PAP would eliminate a regular audit. Instead, any audit would be triggered only by a CLEC's challenging the accuracy of the data or PAP scoring, with Verizon employing an independent auditor "in consultation with the Commission."⁴⁴ In the proposed revisions, the Commission's role in assessing data accuracy is described as follows:

*At any time, the Commission may conduct an inquiry of selected portions of the Plan to assess whether Verizon is accurately recording and reporting CLEC and Verizon service quality data. The Commission may perform Metric Replication to assure that the data reported in the monthly reports accurately reflects the service quality being provided to the CLECs.*⁴⁵

data being tested. For this reason, the permutation test is sometimes referred to a bootstrap or randomization procedure, since it derives its results by bootstrapping (or randomizing) on the very data it is trying to test.

⁴² Maryland PAP, p. 25.

⁴³ Maryland PAP, p. 25.

⁴⁴ *Verizon PAP Amendment Filing*, Attachment 3, at 67 (Appendix F); *Verizon Comments*, Exhibit 1, at 67 (Appendix F).

⁴⁵ *Verizon PAP Amendment Filing*, Attachment 3, at 67 (Appendix F); *Verizon Comments*, Exhibit 1, at 67 (Appendix F).

Because Liberty has acted an independent auditor of the Maryland PAP on two occasions in the past, it would be inappropriate for it to comment on whether these changes are advisable and justified. However, Liberty recommends that the Commission consider the whether past audits have been valuable and whether given the results of these audits, it considers automatic, regular audits to be necessary. Furthermore, if the Commission should conclude that it finds audits in the future to be important, Liberty recommends that the Commission consider whether the proposed amended language in the PAP is adequate to address that need.

9. Other Issues

Liberty believes that the other proposed PAP changes that are material have a relatively minor impact and most are improvements over the current PAP. These are shown in Appendix A. An example is the change in the reporting requirements. In the current PAP there is no requirement that Verizon provide PAP reports to the Commission, although Verizon apparently provides such reports upon request by the Commission. The proposed revisions would require Verizon to provide the reports to the Commission on a monthly basis.

Appendix A

Significant Differences between Proposed and Existing Verizon MD PAPs

Issue	Existing PAP (9/1/03)	Proposed PAP (11/21/06, modified 1/22/07)
1. Document structure and organization	Document not well organized and incomplete in some instances.	Document better organized and easier to understand.
2. Service Segmentation	Three segments: Mode of Entry (MOE), Critical Measures, and Special Provisions. Also a separate Change Control Assurance Plan (CCAP).	Two Segments: MOE and Critical Measures. No CCAP. Many of the Special Provisions measures are already in the MOE and Critical Measures segments, but the elimination of the Special Provisions segment reduces the dollars at risk for them. One of the CCAP measures has been added to the Critical Measures.
3. MOE modes	Five modes: Resale, UNE-P, UNE-Loop, Interconnection Trunks, DSL	Three modes: Resale POTS, Loop-Based (including DSL), Interconnection Trunks
4. Dollars at Risk	Total: \$160.67M (\$155.19 M + \$5.48M for CCAP) MOE: \$41.31 (w/o doubling) Critical Measures: \$54.29 Special Provisions: \$18.64	Total: \$55.50M MOE: \$13.71 (w/o doubling) Critical Measures: \$28.08
5. Audits	Subject to annual audit, by Commission Staff or independent auditor selected by Commission and paid by Verizon MD.	No regular audit specified. “At any time, the Commission may conduct an inquiry of selected portions of the Plan to assess whether Verizon MD is accurately recording and reporting CLEC and Verizon MD service quality data.” If CLEC challenges accuracy of data or scores, Verizon MD, in consultation with the Commission, will hire an independent auditor to review the challenged material.
6. Reports	Specifies that Verizon MD will report performance on the PAP on a monthly basis. Specifies that reports will be provided to CLECs within 27 days of the end of the month. Requires Verizon MD to make available CLEC-specific C2C electronic reports to requesting CLECs.	Same as current PAP, but also specifies that aggregate PAP reports will be available to the Commission and requires availability to CLECs of individual and aggregate reports on the Verizon MD website and the availability of the underlying data as flat files. Specifies that reports will be available on the 27 th calendar day following the data month reported.
7. Timeliness of processing bill credits for CLECs	Processed within 30 days of the close of the second month after the month in which performance is being reviewed. If the credits exceed the balance due to Verizon MD, the net balance will be carried as a credit to the next month’s bill. Verizon MD will issue checks instead of bill credits to CLECs no longer taking service from Verizon MD.	Same as current with some differences as follows. “To the extent warranted, bill credits will appear on each CLEC’s bill within three months after the month in which the unsatisfactory performance has occurred.” However, also specifies that the bill credits will be processed within 15 days of performance reporting and will appear on next available bill, subject to bill closing date.

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8. Scoring for parity measures	<p>0 for $Z > -0.8225$ -1 for $-1.645 < Z \leq -0.8225$ -2 for $Z \leq -1.645$ Scores of -1 are changed to 0 if Verizon MD achieves a score of 0 for the next 2 months (“-1 Recapture Provision”).</p>	<p>0 for $Z > -1.645$ -1 for $-3.290 < Z \leq -1.645$ -2 for $Z \leq -3.290$ The -1 Recapture Provision has been eliminated. For the Critical Measure Individual Rule only: -3 for $Z \leq -4.935$ The elimination of the -1 Recapture Provision and the change in the Critical Measure Individual Rule allow the bill credits to be calculated based on only a single month’s performance.</p>
9. Scoring for benchmark measures	<p>For metrics with 95% standards: 0 for $\geq 95\%$ -1 for $\geq 90\%$ and $< 95\%$ -2 for $< 90\%$ Specific requirements for other benchmark measures. Scores of -1 are changed to 0 if Verizon MD achieves a score of 0 for the next 2 months (“-1 Recapture Provision”).</p>	<p>Same as current PAP but adds a special scoring mechanism for Critical Measure Individual Rule: -3 for $< 85\%$ In addition, the -1 Recapture Provision has been eliminated. The elimination of the -1 Recapture Provision and the change in the Critical Measure Individual Rule allow the bill credits to be calculated based on only a single month’s performance.</p>
10. MOE sub-measures and weights	<p>Appendix A provides a list of sub-measures and the weights for each in all 5 modes</p>	<p>Appendix A provides list of sub-measures the weights for each in the 3 remaining modes. Some sub-measures are changed from the corresponding modes in the old PAP. Most of the changes involving removing measures, but a few measures have been added. Some, but not all changes, are due to the elimination of some products as a result of the <i>TRO</i> and <i>TRRO</i> (e.g., line sharing). Weights are largely the same.</p>
11. Calculation of MOE bill credits	<p>Bill credits based on aggregate weighted scores. For each of the 5 MOE modes, tables specify increasing payment amounts between minimum and maximum aggregate scores. In addition, there is a special provision for determining the payment amounts (Domain Clustering Rule) if a certain specified percentages of 4 domains (Pre-Order, Ordering, Provisioning, and Maintenance) contribute to the scores.</p>	<p>There is no Domain Clustering Rule. As noted above there are only 3 MOE modes. The minimum aggregate scores for these modes are different from those of the corresponding modes in the current PAP. For the two MOE modes that are equivalent to those in the existing PAP (Resale and Trunks), the maximum dollars at risk are essentially the same. For Loop-Based, which effectively combines the UNE-Loop and DSL modes in the current PAP, but with the removal of certain discontinued products (e.g., line sharing and line splitting), the dollars at risk are somewhat smaller than the combined UNE-Loop and DSL dollars at risk in the current PAP.</p>
12. Critical Measures sub-measures, maximum bill credits, and weights	<p>Specifies the sub-measures contributing to Critical Measures bill credits. Also specifies maximum bill credits most sub-measures. For some sub-measures weights are used to allocate the available bill credits within a category if some sub-measures have zero or</p>	<p>Significant reduction in the number of sub-measures, which is the result, in part, of the elimination of products and measures as a result of the <i>TRO</i> and <i>TRRO</i>. However, some measures have been eliminated that appear to be unrelated to this change. Some measures</p>

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	small sample size.	have also been added. Maximum bill credits are fixed and not reallocated based on small sample size; the weights quoted are simply another way of expressing the maximum bill credits. Total dollars at risk for Specials and Other sub-measures has significantly increased, although the overall dollars at risk is much lower, largely because of the elimination of the TRO-related products.
13. Critical Measures Individual Rule	Critical Measures bill credits to a CLEC result both from aggregate performance (Aggregate Rule) and individual performance (Individual Rule). The Aggregate Rule applies if the performance score aggregated over all CLECs is less than or equal to -1 for any given sub-measure in a month. The Individual Rule applies if the performance score for a single CLEC is less than or equal to -1 for two consecutive months. An individual CLEC receives bill credits only through one of the methods, not both. The Individual Rule applies only if the Aggregate Rule is not triggered in a given month.	Also has an Aggregate and Individual Rule. However, the Individual Rule is triggered if an individual CLEC receives a score of -3 on a given sub-measure. Again, the Individual Rule applies only if the Aggregate Rule has not been triggered in a given month.
14. Critical Measures bill credits	Aggregate Rule bill credits apply for performance scores between -1 and -2, increasing in 10 incremental amounts between these two figures. For parity measures, these correspond to Z scores between -0.8225 and -1.645. For benchmark measures, these correspond to specific absolute measure results; for example, the range is 90% to 95% for measures with a 95% standard. The bill credits are allocated to all CLECs with scores less than or equal to -1 based on their transaction volumes and the difference in performance relative to the standard. Individual Rule bill credits are determined in a similar manner. However, the total dollars at risk are divided by the 1/3 of the aggregate CLEC volume to determine the payment per transaction, which is then multiplied by the CLEC volume to determine the payment.	Aggregate Rule bill credits also apply for performance scores between -1 and -2, with 10 increments. However, for parity measures, this corresponds to Z scores between -1.645 and -3.290. The corresponding absolute measure results are the same as the existing PAP for benchmark measures. Individual Rule bill credits are determined in a manner similar to the existing PAP but are triggered by scores of -3 in one month instead of -1 in two consecutive months.
15. Treatment of small sample sizes	Provides for special scoring rules for benchmark measures with small sample size. Also specifies small sample size limits below which a statistical score will not be reported for parity measures.	Uses same scoring method for benchmark measures with small sample size but now also provides for scores of -3 to be sued in the Critical Measures Individual Rule. Uses the same small sample size rules for parity measures. For Critical Measures a benchmark measure with a small sample size and a score of -1, the payment is fixed to be 50% of the maximum allocation.
16. Statistical analysis	For parity measures, use an LCUG t-test except for sample sizes less than 30 that still meet the minimum sample size requirement.	For parity measures, use a permutation test for all measures meeting the minimum sample size requirement, although alternative

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	In those cases, use a permutation test.	computational procedures can also be used when they would produce the same results.
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