Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Connect America Fund	)	WC Docket No. 10-90
	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
	)	
Establishing Just and Reasonable Rates for Local Exchange Carriers	)	WC Docket No. 07-135
	)	
High-Cost Universal Service Support	)	WC Docket No. 05-337
	)	
Developing an Unified Intercarrier Compensation Regime	)	CC Docket No. 01-92
	)	
Federal-State Joint Board on Universal Service	)	CC Docket No. 96-45
	)	
Lifeline and Link-Up	)	WC Docket No. 03-109
	)	
Universal Service Reform – Mobility Fund	)	WT Docket No. 10-208
	)	

INITIAL COMMENTS
of the
NATIONAL EXCHANGE CARRIER ASSOCIATION, Inc.;
NATIONAL TELECOMMUNICATIONS COOPERATIVE ASSOCIATION;
ORGANIZATION FOR THE PROMOTION AND ADVANCEMENT OF SMALL TELECOMMUNICATIONS COMPANIES; and the
WESTERN TELECOMMUNICATIONS ALLIANCE

January 18, 2012

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Summary

The Commission must act to define a sufficient and predictable Connect America Fund ("CAF") for rural rate-of-return regulated local exchange carriers ("RLECs"). To date, "reforms" adopted in this proceeding for RLEC universal service fund ("USF") and intercarrier compensation ("ICC") mechanisms have consisted entirely of caps, cuts and phase-outs, despite record evidence demonstrating that *additional* funding is needed to realize the Commission's broadband goals.

The RLEC Plan, presented to the Commission in earlier phases of this proceeding, provides the Commission with a reasonable template for a new broadband-focused RLEC CAF. The RLEC Plan satisfies statutory principles of universal service, is sensible and practical, and can be accomplished within a reasonable budget. If for some reason the Commission does not adopt the RLEC Plan, the Rural Associations suggest that at a minimum it develop mechanisms that provide RLECs with sufficient and predicable CAF support for standalone broadband offerings, for middle mile costs, and for conversions and upgrades to IP-enabled switching.

The Rural Associations urge the Commission not to impose broadband-specific public interest obligations, broadband service measuring and reporting requirements, or other new burdensome "accountability" mandates upon RLECs, particularly in the absence of funding mechanisms designed to sustain broadband services. RLECS have been fully accountable for decades with respect to their use of federal high-cost fund support (HCFS). Adding new RLEC-specific rules or accountability standards is unwarranted. Nor should the Commission place new broadband network interconnection obligations on RLECs, as no need exists for such new regulations.

The Commission should also defer further action with respect to represcribing the interstate authorized rate of return ("RoR") until it establishes clear and contemporary procedures governing the represcription process, and until its USF and ICC reforms are implemented. Only then will the Commission be in a position to establish a legally-sustainable basis for a new rate prescription. Based on analyses of currently-available data conducted by outside economic experts attached to these comments, a reasonable rate represcription should result in a RoR of *at least* 11.25 percent for RLECs. Therefore, no harm to non-RLECs will result from leaving the existing rate in place while the Commission updates its rules governing RoR represcription and focuses its attention on other USF and ICC reform matters.

Similarly, the Commission should reconsider its premature decision to employ quantile regression methods to limit reimbursements of capital and operating expenses. In addition to concerns previously raised regarding unfair and unlawful retroactive application of such models to prior investments, the Rural Associations show herein and in accompanying technical analyses (including a paper by Dr. Roger Koenker, on whose work the Commission relied when adopting quantile regression methods) that errors in the proposed regression models will lead to serious distortions in universal support payments. The Commission should instead adopt the capital and operating expense limitations proposed in the RLEC Plan.

Finally, the Commission should proceed with substantial caution in phasing out support in areas with unsubsidized competition or otherwise seeking to "carve up" study areas. Treading down this path without addressing ongoing RLEC obligations as COLRs threatens the sustainability and affordability of services for consumers in expensive and

difficult-to-serve areas who currently receive service only because of universal service support. If the Commission pursues this path, it should rely on state expertise and data-driven judgment, rather than inaccurate national maps, to make factual determinations regarding the extent of competition in a particular area. It should also establish clear and fair procedural rules governing such determinations. The Commission likewise needs to consider the full implications of carving off "remote" consumers, and whether doing so might put services for other consumers in the same study area at risk.

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The Rural Associations listed above[1] hereby submit their initial comments on questions identified in sections XVII A-K of the Commission's *Report and Order and*

[1] The National Exchange Carrier Association, Inc. (NECA) is responsible for preparation of interstate access tariffs and administration of related revenue pools, and collection of certain high-cost loop data. *See generally,* 47 C.F.R. §§ 69.600 *et seq.*; *MTS and WATS*

Further Notice of Proposed Rulemaking in this proceeding.[2] For consumers in rural areas, the lenders and investors who provide access to capital for rural broadband deployment, the rural local exchange carriers ("RLECs") committed to serving those customers, and for the Rural Associations, the *FNPRM* implicates many essential issues, including: (1) a potential Connect America Fund ("CAF") mechanism to enable sustainable broadband network deployment and operation by RLECs; (2) application of broadband service obligations and other regulatory mandates to RLECs that are premature and/or not commensurate with the level of support provided by an RLEC CAF mechanism; (3) represcription of the interstate authorized rate of return ("RoR"); (4) limits on the extent to which RLECs may recover capital and operating expenses from the federal universal service fund ("USF"); and (5) proposals to reduce support in areas served by unsubsidized competitors, and other policies that would undermine consumer access to affordable and reasonably-comparable services offered by a carrier of last resort ("COLR").

Market Structure, CC Docket No.78-72, Phase I, Third Report and Order, 93 FCC 2d 241 (1983). The National Telecommunications Cooperative Association (NTCA) is a national trade association representing more than 580 rural RoR regulated telecommunications providers. The Organization for the Promotion and Advancement of Small Telecommunications Companies (OPASTCO) is a national trade association representing approximately 460 small ILECs serving rural areas of the United States. The Western Telecommunications Alliance (WTA) is a trade association that represents over 250 small rural telecommunications companies operating in the 24 states west of the Mississippi River.

[2] *Connect America Fund,* WC Docket No. 10-90, *A National Broadband Plan for Our Future,* GN Docket No. 09-51, *Establishing Just and Reasonable Rates for Local Exchange Carriers,* WC Docket No. 07-135, *High-Cost Universal Service Support,* WC Docket No. 05-337, *Developing an Unified Intercarrier Compensation Regime,* CC Docket No. 01-92, *Federal-State Joint Board on Universal Service,* CC Docket No. 96-45, *Lifeline and Link-Up*, WC Docket No. 03-109, *Universal Service – Mobility Fund,* WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, FCC 11-161 (rel. Nov. 18, 2011) (*Order* or *FNPRM*).

I. THE FCC'S "CONNECT AMERICA FUND" INITIATIVE WILL NOT SUCCEED UNLESS AND UNTIL ***ALL*** OF RURAL AMERICA CAN RECEIVE REASONABLY COMPARABLE BROADBAND SERVICE.

A. The Commission Should Provide For Sufficient, Predictable, And Specific Funding Mechanisms To Promote Broadband Deployment And Operation In RLEC-Served Areas.

The CAF in its current form is not a solution to the challenges of national broadband deployment, availability, or adoption because it does not provide for equivalent connectivity opportunities nationwide. Instead, it threatens to leave wide swaths of rural America behind, with broadband that will increasingly become substandard when compared to the speed and affordability of similar services available to other consumers. The Commission should use the *FNPRM* to correct this current state of affairs.

No more straightforward depiction of this state can be found than in a presentation delivered by Commission staff to the "USF Caucus" formed by Representatives Don Young of Alaska and Collin Peterson of Minnesota in December 2011. This presentation, a copy of which is provided herewith as Appendix A, noted that the new Connect America Fund for "Price Cap Areas" would provide "an additional $300 million in CAF funding" for 2012, and then discussed the development of a new CAF that would result in up to $1.8 billion in funding for those areas – or an increase of approximately $800 million above what price cap-regulated carriers receive today in USF support.

In contrast, the "action words" associated with future high-cost support for RoR carriers from that same presentation tell a very different story. Without exception, the Commission's actions with respect to RLECs are negative – and clearly and

unmistakably presented as such. Specifically, the presentation speaks to reform for RLECs as composed entirely of new "limits," with support "reduced," "phased out," "eliminated," or "capped."

Most RLECs are locally-owned or managed cooperatives or small businesses that have long provided quality and affordable voice services throughout their study areas as COLRs. RLECs have made substantial progress upgrading their networks incrementally in recent years to offer affordable broadband services to more and more rural consumers and businesses.[3] Existing high-cost support levels for RLECs have enabled most of these carriers to deploy at least some level of broadband to a substantial majority of the consumers living in their territories.[4] But many RLECs still need to make additional investments to bring the Commission's desired broadband speeds of 4 megabits per second (Mbps) downstream, and particularly 1 Mbps upstream, to many of their rural customers.[5] The ability of RLECs to make available and sustain the availability of broadband services at these higher speeds (upon reasonable request or otherwise) will therefore require additional investment.

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[3] *See* Comments of NECA, NTCA, OPASTCO, and WTA, WC Docket No. 10-90, *et al.* (filed April 18, 2011) at 56-57 (*Rural Associations April 18 Comments*).

[4] *Id.* at 8, note 6. ("RLEC receipts from high-cost USF support have been increasing at only about 2.5 to 3 percent per year on average in recent years – even as RLEC receipts from ICC have declined over the same period and RLECs have edged out digital subscriber line ("DSL")-speed broadband availability to over 92 percent of their customers, albeit at varying speeds. *See* NECA *Trends 2010*- A report on rural telecom technology (at 5) (available at https://www.neca.org/cms400min/NECA_Templates/PublicInterior.aspx?id=100) (*NECA Trends 2010*).

[5] *See* Reply Comments of NECA, *et al.*, WC Docket No. 10-90, *et al.* (filed May 23, 2011) at 47 (*Rural Associations' May 23 Replies*).

Both the financing of these further upgrades, and the continuing quality of existing services, are threatened by the *Order*'s substantial reductions of the high-cost support and intercarrier compensation ("ICC") revenue streams upon which RLECs rely. It is difficult, if not impossible, to see how reforms intended exclusively to *reduce* RLEC support can be expected to *sustain* existing RLEC broadband services, much less *promote* additional broadband deployment and upgrades. These difficulties are compounded when reductions specified in the *Order* are combined with proposals in the *FNPRM*, which appear primarily aimed at making additional reductions to support for operations and investment in rural, high-cost areas served by RLECs. These *FNPRM* proposals include reduction of the authorized interstate rate of return,[6] reduction of support for carriers with some competitive overlap,[7] decrease of eligible ICC recovery by an additional percent each year,[8] and the ultimate transition of other ICC rate elements to a price of zero.[9]

Moreover, the *Order*, together with the *FNPRM,* contemplates a total CAF and existing high-cost mechanism budget – including ICC restructuring – that is limited roughly to the size of the current High-Cost Fund (HCF) budget. That approach *might* be logical had the Commission engaged in a detailed examination of the budget question and determined, based upon review of the evidence, that true "universal service" with respect to broadband-capable network deployment could be achieved with precisely that amount of support. To the contrary, however, the Commission's own initial estimates

[6] *FNPRM* ¶ 1057.

[7] *Id*. ¶¶ 1061-1078.

[8] *Id*. ¶ 1329.

[9] *Id*. ¶ 1297.

demonstrated that robust broadband deployment throughout the nation requires an ambitious commitment *not* reflected in the budget or CAF plan the Commission has adopted.[10]

Under the plan adopted in the *Order* and with most of the changes proposed in the *FNPRM*, areas served by larger carriers are likely to receive substantial additional CAF funding to deploy broadband at required 4/1 Mbps speeds, while RLEC areas that have some broadband service – but at speeds lower than 4/1 Mbps – are likely to receive reduced high-cost support, with such reductions being mitigated only if adversely-impacted RLECs can meet a formidable burden of proving that loss of support creates a risk to *voice* service.[11]

The Rural Associations do not discount the need for broadband deployment in high-cost areas served by other carriers. All of rural America needs and deserves access

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[10] *See Connecting America: The National Broadband Plan*, FCC (rel. Mar. 16, 2010) at 136-138, 143-148 (*NBP*). *See also Omnibus Broadband Initiative*, The Broadband Availability Gap: OBI Technical Paper No. 1 (April 2010) (*OBI Broadband Availability Gap Paper)*. On top of being tasked to do more to deploy broadband with less in support, RLECs are effectively being asked to "write off" all ICC restructuring over the next 6 years, given that such restructuring will be squeezed into today's high-cost budget. This is a far cry indeed from the sensible reform objective established by this Commission in the 1990s, when the more surgical aim was to extract implicit support from ICC charges in cooperation with state commissions. *See, e.g., Access Charge Reform*, CC Docket No. 96-262, *Price Cap Performance Review for Local Exchange Carriers*, CC Docket No. 94-1. *Transport Rate Structure and Pricing*, CC Docket No. 91-213, *End User Common Line Charges*, CC Docket No. 95-72, First Report and Order, 12 FCC Rcd. 15982 (1997) ¶¶ 9-10 (indicating the express congressional goal for ICC reform is that the Commission "should" remove implicit support from intercarrier charges "[t]o the extent possible," and that the process for doing so should be coordinated with states to avoid "enormously disruptive effects on both ratepayers as well as the affected LECs").

[11] The "broadband availability gap" has often been mistakenly viewed as a question only related to "unserved" areas. But as the Rural Associations have made clear, many RLEC study areas are served by basic DSL-level broadband facilities that require further investment and upgrades to enable reasonably comparable services at the speeds called for in the Order. *See, e.g., Rural Associations' May 23 Replies* at 47.

to reasonably comparable broadband, consistent with the statutory mandate for universal service. This is precisely why the Rural Associations entered into the Consensus Framework with a number of these larger carriers.[12] In adopting its *Order* and *FNPRM*, however, the Commission has done little or nothing to stimulate or sustain broadband deployment in areas served by RLECs. Instead, the Commission's adoption of a more robust CAF for price cap areas – paired with nothing but cuts (and more proposed cuts) for RLEC areas – threatens to create a new "rural/rural" divide.[13]

In other words, rather than providing sufficient, predictable, and specific universal service support for <u>all</u> rural areas as called for by the Communications Act, the *Order* and *FNPRM* contemplate a "leapfrogging" approach to rural broadband deployment that will punish RLECs for their previous broadband deployment successes – and that will leave consumers in RLEC areas with broadband that may become increasingly unaffordable, or that will be surpassed soon in speed and quality by even the most conservative estimates of market trends, or both.

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[12] *See* Letter from Walter B. McCormick, Jr., United States Telecom Association, *et al.*, to Chairman Genachowski, FCC, WC Docket No. 10-90, *et al.* (filed July 29, 2011) (*Consensus Framework*).

[13] Another prominent example of disparate and puzzling treatment is the Commission's announced intention to focus on "total earnings" when dealing with future requests for waivers by RLECs seeking relatively minimal amounts of additional USF or ICC support, while it bestows millions of dollars in new support (as well as billions of dollars of access and reciprocal compensation savings) upon large carriers like Verizon and AT&T without requiring any similar evidence that they need it. As explained in the Petition for Reconsideration and Clarification of NECA, OPASTCO and WTA, WC Docket No. 10-90, *et al.,* (filed Dec. 29, 2011) at 21, note 57 (*December 29 Petition for Reconsideration*), recent annual reports for Verizon and AT&T show that earnings for these companies have averaged about twice the amount of the entire proposed $4.5 billion annual high-cost program budget, yet the Commission plans to provide additional support and cost reductions without any evidence of need.

This is, to say the least, counter-intuitive, and it highlights the need for a course correction in this proceeding. RLEC deployment of broadband has most often been accomplished by enabling basic DSL service in the first instance, but RLECs have also edged out fiber trunks and lines to meet consumer and business demands. RLECs often deploy fiber to the node as a first step, and their take-rates have increased 17 percent from 2009 to 2010.[14] These accomplishments were recognized and applauded several years ago when the Joint Board characterized the RLEC industry achievements as "commendable" and recommended that existing USF policies should be ***sustained*** for RLECs precisely because they had enabled RLECs to do such a good job.[15] Moreover, and more impressively, by leveraging existing assets strategically, these RLEC deployments of advanced services were undertaken with little increased demand for USF.[16]

But the job of broadband deployment in RLEC-served areas is not done, and the Commission's approach to initiate some broadband deployment in rural areas not served by RLECs at the expense of sustained progress in rural areas served by RLECs falters in

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[14] *See NTCA 2010 Broadband/Internet Availability Survey Report*, National Telecommunications Cooperative Association (Jan. 2011) at 13, *available at* http://www.ntca.org/images/stories/Documents/Advocacy/SurveyReports/2010_NTCA_Broadband_Survey_Report.pdf.

[15] *High-Cost Universal Service Support*, WC Docket No. 05-337, *Federal-State Board Joint Board on Universal Service*, CC Docket No. 96-45, Recommended Decision 22 FCC Rcd. 20477 (2007) ¶¶ 30, 39.

[16] *See Connect America Fund*, WC Docket No. 10-90, *A National Broadband Plan for Our Future*, GN Docket No. 09-51, *Establishing Just and Reasonable Rates for Local Exchange Carriers*, WC Docket No. 07-135, *High-Cost Universal Service Support*, WC Docket No. 05-337, *Developing an Unified Intercarrier Compensation Regime*, CC Docket No. 01-92, *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, *Lifeline and Link-Up*, WC Docket No. 03-109, Notice of Proposed Rulemaking and Further Notice of Proposed Rulemaking, 26 FCC Rcd. 4554 (2011) at 59, Figure 7 (*2011 USF/ICC Transformation NPRM*).

the face of statutory objectives that compel the Commission to "preserve and advance"[17] universal service throughout the Nation. As discussed further below, the Commission should take action through the *FNPRM* to define and implement a sufficient, predictable, and specific "broadband future" for RLEC-served areas to ensure that reasonably comparable services will *become and remain* available *throughout* all of rural America.

B. The RLEC Plan Satisfies the Statutory Principles of Universal Service and is Sensible, Reasonable, And Budget-Oriented.

1. The RLEC Plan Fits Within a Reasonable USF Budget.

The RLEC Plan, as presented first in April 2011 and explained further over the course of the following six months,[18] is a sensible, surgical, well-defined approach to deploy and maintain increasing levels of broadband within a reasonable budget. It represents a reasonable path forward with respect to how to develop a CAF for RLEC areas.

The *FNPRM* states, "[t]he Rural Associations explain that their plan is calibrated to aim for a budget target $2.05 billion in combined funding for USF and their suggested restructure mechanism in the first year of implementation, and may grow to $2.3 billion over the next six years."[19] This portrayal of the Rural Associations' position, however, is provided out of context. In first presenting the RLEC Plan in April 2011, the Rural Associations did not specify a target budget for that Plan. Rather, the Rural Associations referenced the very low historical growth rate in USF funding that supports rural carriers, and proposed various mechanisms by which this already efficient use of USF funding

[17] 47 U.S.C. § 254 (emphasis added).

[18] *See Rural Associations April 18 Comments* at 6-10; *Consensus Framework* at 2.

[19] *FNPRM* ¶ 1034.

could be enhanced to support responsible broadband deployment. These methods included prospective limitations on certain expense recovery categories, including a carefully calibrated approach to recovery for new investments.

Subsequently, and as part of a broader industry consensus plan, the Rural Associations agreed that a near-term $2.3 billion budget target *might* be reasonable in the context of that Consensus Framework. In fact, when submitting the Framework to the Commission, the Rural Associations, along with the other signatories, emphasized that the Framework represented "difficult compromises" that "would not necessarily [be] agree[d]" to by the parties apart from that industry agreement.[20] The Rural Associations and other signatories were clear that parameters of the Framework, which included an ultimate $2.3 billion budget target for RLEC support by the sixth year, were created "in the interest of obtaining an industry consensus that would enable regulatory certainty and the unimpeded business of building broadband. These concessions were made carefully and in concert with the movement of other carriers."[21] Indeed, given the Commission's own assessment of the broadband availability gap in the National Broadband Plan, even a $2.3 billion budget by the sixth year after reform would require hard choices and substantial belt-tightening at the expense of deploying ubiquitous broadband of 4/1 mbps or greater speeds. Therefore, the Commission's assessment that the Rural Associations necessarily support a $2.3 billion budget in the absence of other elements of the *Consensus Framework* is, at best, a statement out of context.

[20] *Consensus Framework* at 1.

[21] *Id.* at 2.

This being said, the Rural Associations continue to believe a budget beginning at just over $2 billion in 2012 and increasing to $2.3 billion by 2017, together with adoption of material portions of the RLEC Plan, *could* do more than the *Order* and *FNPRM* to enable reasonable deployment and maintenance of broadband at least consistent with historical RLEC operations. Unfortunately, in light of the cuts and steep constraints on cost recovery already adopted in the *Order* and the further cuts dangling overhead in the *FNPRM*, it is questionable whether investors and lenders can reasonably be expected to provide funding for *any* significant broadband deployment efforts by RLECs in 2012. Still, if the Commission intends to address (as it should) the need for true universal service (including the deployment of at least 4/1 broadband in RLEC-served areas) the RLEC Plan provides a reasonable basis for doing so. The budget specified for that plan is consistent with historical growth patterns in the USF, and this plan would better enable completion of the "job still to be done" in RLEC-served areas.[22]

2. The RLEC Plan Properly Avoids Retroactively-Applicable Constraints on Cost Recovery.

The RLEC Plan properly focuses on what the "broadband future" of rural America can look like, while also providing appropriate incentives and carefully designed limits to ensure responsible investment going forward. By contrast, the Commission's foray into retroactive application of new USF reductions and constraints – such as regression analysis-based caps, total caps on support, and elimination of safety net additive support – undermines investor and lender confidence. As has been noted in

[22] *Id.* ("[T]he framework further proposes that the Commission manage the phase-in of model-based support to ensure that there is sufficient funding for all other purposes, including the access restructuring mechanisms. In addition, the Commission could defer funding of the CAF for the study areas of AT&T and Verizon for up to two years. The deferred amounts would be redirected to other funding needs within the budget.")

other contexts in this proceeding, RLECs invested under prior rules that enabled cost recovery for "multiple use" networks, and by doing so they advanced broadband deployment in areas in which no business case would have existed absent USF and other cost recovery mechanisms. The same conditions that created critical carrier reliance on cost-recovery mechanisms at the time of such prior investment continue to exist today, and carriers continue to rely on regulatory cost recovery mechanisms to recoup the capital invested in their networks. Those mechanisms, then, must remain in place until at least such time as those investments are recovered. It would be fundamentally unfair and counterproductive to "change the rules" mid-game.

In the first instance, carriers (and lenders) have made long-term investments upon reasonable reliance that costs could be recovered. The applicability of new regulations to prior investment implicates retroactive rulemaking and is in direct conflict with "familiar considerations of fair notice, reasonable reliance, [and] settled expectations."[23] The applicability of newly-formed rules to investment made before those rules were adopted or effective conflicts with the D.C. Circuit's understanding that rules adopted pursuant to the Administrative Procedure Act (APA) are prospective in application only.[24] The Supreme Court has stated clearly that statutory grants of legislative rulemaking authority do not include the power to promulgate retroactively-effective regulations

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[23] *See Marie v. Securities and Exchange Commission*, 374 F.3d 1196, 1207 (D.C. Cir. 2004) (*Marie v. SEC*) (SEC disciplinary action against auditors for 1994 actions invalidated because standard imposed was not effective during period of auditors' actions), quoting *Landgrafv. USFilm Products*, 511 U.S. 244 (1994).

[24] *Retail, Wholesale and Department Store Union, AFL-CIO v. National Labor Relations Board,* 466 F.2d 380, 388 (D.C. Cir. 1972), citing 5 U.S.C. § 551(4) (internal citations omitted) (company's failure to reinstate striking workers was not an unfair practice where company relied upon then-existing regulatory standards, rather than subsequently-promulgated guidelines).

absent express Congressional authority: "Retroactivity is not favored in the law. Thus, congressional enactments and administrative rules will not be construed to have retroactive effect unless their language requires this result."[25]

The *sine qua non* of impermissible retroactive applicability is "whether the new provision attaches new legal consequences to events completed before its enactment."[26] The Commission's attempt to subject previous investment to new recovery rules is the very sort of retroactive action frowned upon by the APA because it "alter[s] the legal consequences of past actions."[27] The Commission's actions in this regard also nullify investors' confidence. RLECs rely upon a combination of end-user revenues, investors' capital, and support to recover costs. *Post-hoc* determinations by the Commission that suddenly make prior eligible investments ineligible will, obviously, wipe out investor confidence in a key element of the overall cost recovery picture.

To be clear, the Rural Associations do not argue that the investment or lending market cannot ever withstand support reductions. Rather, the point is that markets will be wary of making any investment or lending additional sums if it appears that carriers' to recover costs under current rules may be taken away in the future by agency whim. This will engender results that are opposed diametrically to the Commission's goal of expanded broadband deployment. This is precisely why the RLEC Plan included a prospective constraint on recovery of investment-related expenses, and is one reason,

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[25] *Bowen v. Georgetown University Hospital*, 488 U.S. 204, 208 (1988) (internal citations omitted) (retroactive application of Medicaid cost limitation regulations ruled invalid). *See also*, *Chadmoore Communications, Inc. v. FCC*, 113 F.3d 235 (D.C. Cir. 1997) (elimination of extended implementation period for specialized mobile service (SMR) license was not retroactive rulemaking because it did not increase a party's liability for past conduct or impose new duties for completed transactions).

[26] *Marie v. SEC*, 374 F.3d at 1207, quoting *Landgraf*, 511 U.S. at 269, 270.

[27] *See Bowen*, 488 US at 219.

among many, why the Commission should adopt that constraint in lieu of finalizing regression-analysis based caps as described in the *FNPRM*. As discussed below, the RLEC Plan's approach provides a more reasonable and well-tailored limitation on investment in new plant, based upon local conditions and the depreciated state of each carrier's existing facilities.[28]

3. The Interstate Cost Allocation Under the RLEC Plan Offers a Reasonable Means of Transitioning from Legacy Support Mechanisms to a Broadband-Focused CAF.

The Commission seeks comment on the proposed shifting of supportable network costs from the intrastate jurisdiction to the interstate jurisdiction based upon the "Broadband Take Rate" under the RLEC Plan.[29] The Rural Associations submit that this approach provides a reasonable means of recognizing increasing interstate use of loop plant associated with broadband services.

Under existing Commission precedent, broadband services are considered interstate in nature, and the costs of broadband-only loop plant are fully allocated to the interstate jurisdiction.[30] The "Broadband Take Rate" in the RLEC Plan offers a

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[28] *See Rural Associations April 18 Comments,* Appendix A, attaching Vantage Point's Proposal for Allowed Loop Plant Capital Expenditures For High Cost Funding of Future Loop Plant Investments. Further commentary with respect to the many shortcomings of the regression analysis-based caps is provided in section IV, *infra*, and related Appendices hereto.

[29] *FNPRM* ¶¶ 1036-1037.

[30] *GTE Telephone Operating Cos.*, CC Docket No. 98-79, Memorandum Opinion and Order, 13 FCC Rcd. 22466 (1998) (found GTE's ADSL Internet access service to be an interstate service). *See also Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, CC Docket No. 96-98, Intercarrier Compensation for ISP-Bound Traffic, CC Docket No. 99-68,* Order on Remand and Report and Order, 16 FCC Rcd. 9151 (2001) ¶ 52 (subsequent history omitted); Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities, GN Docket No. 00-185, Internet Over Cable Declaratory Ruling Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities, CS Docket No. 02-52,

reasonable proxy for reflecting increased use of loop plant for these interstate services. Specifically, as individual customers within the RLEC customer base adopt broadband, the RLEC's loop plant becomes increasingly associated with interstate usage, and the costs should in turn be allocated to the interstate jurisdiction under the axiom that revenues and costs should be matched to the extent possible.[31] Although the Rural Associations could have proposed that 100 percent of all loop costs would "flash cut" to the interstate jurisdiction, this approach would not reflect the fact that many customers will continue to use those loops for intrastate (local) services as well. Nor is it clear how such a "flash cut" to 100 percent allocation of costs to the interstate jurisdiction can be accommodated without substantially increasing demands on the USF or requiring unreasonably high broadband rates or cost benchmarks, which would have no tie to ensuring affordable and reasonably comparable broadband rates.[32]

Moreover, by relying upon an individual carrier's "take rate" to drive the gradual allocation of costs to the interstate jurisdiction, the RLEC Plan stimulates broadband

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Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd. 4798 (2002) ¶ 59 (subsequent history omitted).

[31] *See Rural Associations April 18 Comments* at 31-33. It should also be noted that the Rural Associations, recognizing that some use of the loop might remain in the intrastate jurisdiction, proposed to limit the shift in loop plant costs to the interstate jurisdiction resulting from this Broadband Take Rate allocation to 75% – effectively "flipping" today's allocation of loop costs between the intrastate and interstate jurisdictions. *See Order* at Appendix G, new section 36.154(h). Of course, if other carriers will receive "credit" under models for 100% of their loop costs in the interstate jurisdiction, the Rural Associations submit that RLECs should likewise be entitled to have 100% of their loop costs eligible for USF cost recovery as well.

[32] *See* Letter from Robert W. Quinn, Jr., AT&T, Steve Davis, CenturyLink, Michael T. Skrivan, FairPoint, Kathleen Q. Abernathy, Frontier, Kathleen Grillo, Verizon, and Michael D. Rhoda, Windstream, to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al.,* Attach. 1 at 5 (filed July 29, 2011) (*ABC Plan*) (proposing an $80 high-cost benchmark, together with a $256 upper limit, for the precise, results-oriented purpose of squeezing USF/CAF support funding into a $2.2 billion budget under the ABC Plan).

adoption. Rather than assuming the cost of every loop is entirely assigned to (and thus recoverable under) the interstate jurisdiction from the start, the use of a "Broadband Take Rate" in the RLEC Plan allows for increased recovery of broadband-capable plant costs to the extent customers actually use such plant for broadband services.

While the Commission seems to ask whether broadband should be measured at higher speeds (such as 4/1 Mbps speed) rather than the 256 kbps speed referenced in the rules filed by the Rural Associations,[33] this question misunderstands the role of the 256 kbps reference in the RLEC Plan. The 256 kbps speed in the proposed rules was not meant to define the reasonably comparable level of broadband that would be the objective of universal service. Rather, this reference was merely intended to serve as a mechanical proxy to identify increasing interstate use of loop plant over time to access the Internet.[34] The Commission should not confuse this simple proxy mechanism with ultimate broadband speed objectives under a new CAF mechanism.[35] Put even more

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[33] *FNPRM* ¶ 1036.

[34] Another aspect of this "transitional" approach to reflecting increased broadband-focused use of loop plant was the gradual assignment of loop costs to the interstate jurisdiction over time pursuant to new section 36.154(i) of the Rural Associations' proposed rules. Under that proposed subsection, to help manage the transition, the additional costs to be assigned to the interstate jurisdiction based upon the Broadband Take Rate would be phased in over a period of 12 years, rather than "flash cutting" those costs into the interstate jurisdiction immediately. *See Order* at Appendix G, new section 36.154(i).

[35] The Commission also asks how this cost allocation proposal fits within or informs any work of the Federal-State Joint Board on Jurisdiction Separations. *FNPRM* ¶ 1037. This question appears equally applicable to the Commission's price cap CAF plan, which would also appear to provide model-based support for loop plant costs in excess of the 25 percent currently assigned to the interstate jurisdiction. Indeed, the RLEC Plan's approach may raise fewer (if any) concerns from a referral perspective than any model incorporating a 100% flash cut allocation to interstate, since a significant portion (at least 25%) of loop costs would remain clearly within the intrastate jurisdiction under the RLEC approach, with a reasonable, gradual, and carrier-specific transition from current jurisdictional allocations based on actual use.

directly, the Rural Associations do not contend, nor would the Act permit, support for anything *less than* 4/1 Mbps speed; indeed, the Act requires support to enable the availability of broadband "reasonably comparable" to that offered in urban areas – whether that is 4/1 Mbps or something greater.

Finally, the RLEC Plan squarely responds to the Commission's question as to what rule changes would help provide appropriate incentives for "investment in broadband-capable networks, while limiting unrestrained growth in support provided to RoR companies."[36] As discussed above, the RLEC Plan provides reasonable and meaningful incentives for investment in broadband-capable plant by better ensuring that costs and revenues will more accurately be matched between the jurisdictions. The RLEC Plan also contains a reasonable constraint on growth in funding by tying future investment in networks specifically and directly to the replacement of depreciated plant. These steps have the effect of transitioning RLEC USF support more efficiently and effectively to a greater focus upon broadband.

All of these measures more than address stated (and unjustified) "concerns" that RLECs might place outsided demands on USF or benefit from "unrestrained growth" in support. At the risk of repetition, the Rural Associations note yet again that RLEC demand on USF support has grown at a *remarkably low pace* in recent years, even as they have edged out broadband at a "commendable" pace according to the Federal-State Joint Board on Universal Service.[37]

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[36] *Id.* ¶ 1036.

[37] RLECs have increased broadband penetration to their consumers above 92% with only 3% growth per year in USF support over the past several years. *See NECA Trends 2010* at 5; *2011 USF/ICC Transformation NPRM* at Figure 7.

The Rural Associations welcome a substantive debate with the Commission and other stakeholders on the merits of further reform and the encouragement of responsible broadband deployment in RLEC-served areas. But such debate should proceed without resort to rhetoric about "waste, fraud, and abuse" and the use of phrases such as "unrestrained growth" for which there is no empirical, statistical or factual validity. It is long past the time such unsupported claims should have been relegated to the dustbin of regulatory history.

4. The RLEC Benchmark Proposal Derives From the Statutory Mandate to Ensure Reasonable Comparability and Also Helps to Serve the Commission's Budgetary Objectives.

The Commission asks whether a broadband urban wholesale benchmark is "the right approach to determine support under a new RoR mechanism." Specifically, the Commission asks how "wholesale urban costs relate to our obligation to ensure that rural retail rates are reasonable?"[38]

A wholesale benchmark will enable comparison of the costs of the underlying supported broadband-capable network in rural areas with a reasonably comparable network in urban areas, without traversing onto shaky legal ground by comparing unregulated (and unsupported) retail broadband Internet access service rates between different areas. The wholesale cost element also carves away all end-user oriented adornments, such as promotional rates or fees associated with varying levels or bundles of service. A wholesale cost benchmark strips down the consideration to the bare network costs the provider incurs to provide the service. At the same time, a comparison based upon wholesale costs will encourage providers to be more efficient in their retail

[38] *FNPRM* ¶1039.

operations, knowing that any excessive retail costs will require the customer (rather than the USF) to be responsible for such costs – and thus potentially deter adoption or preclude sufficient cost recovery.

The Rural Associations' proposal for an urban wholesale benchmark could be implemented by developing information received from carriers. Wholesale broadband costs could be calculated reliably, for example, starting with surveys of prices for urban Internet access services (such as the Form 477 process) and some further analysis to derive estimates of the wholesale cost components of these services. Periodic evaluation and adjustment will ensure that "reasonable comparability" remains a dynamic standard, particularly as service capabilities exhibit dynamic development. The integrity of the benchmark should be enhanced by discounting urban retail rates by a factor to remove the estimated portion of the rate attributable to non-regulated retail-level costs. This approach avoids the need to determine urban carriers' actual non-regulated costs in calculating the wholesale benchmark. The relevant benchmark should not be based on the price of comparable retail services in a sample of urban areas, since doing so could implicate a Commission imperative to determine the reasonableness of retail rates associated with Title I services. In the alternative, to avoid altogether any direct or indirect retail rate regulation and/or inclusion of non-regulated costs within the support mechanisms, the Commission could simply require CAF recipients who operate in urban areas to provide some estimate of their wholesale (non-retail) costs of network installation and operations in urban areas, and use reliable inputs from those figures to derive the urban wholesale benchmark.

Finally, the Commission asks about the fixed and variable components of the RLEC Plan benchmark, including whether the fixed component of that benchmark should be tied to NECA tariff rates or any other industry metric.[39] The fixed and variable components of the benchmark proposed within the RLEC Plan are important with respect to ensuring reasonable comparability as discussed above, as well as in managing USF/CAF demand and setting appropriate incentives for cost recovery. Specifically, the fixed component of the benchmark would be based upon the urban wholesale benchmark as discussed above, and reflect the per-line costs of deploying a broadband-capable network in such areas. The variable component, in turn, would be estimated at $6.50 per 25% of interstate loop cost allocation (much like today's Subscriber Line Charge in the context of ICLS). This component would help ensure, as an RLEC increases its "Broadband Take Rate" and thus its eligibility for potential recovery of more costs from the interstate jurisdiction, that the RLEC will be called upon to look to its own customers for an increasing proportion of network cost recovery rather than seeking support for all additional interstate costs from the USF/CAF. Each of the fixed and variable components of the proposed benchmark is therefore essential and effective in balancing the need for sufficient cost recovery under USF, reasonable comparability between urban and rural consumer rates, and the establishment of proper incentives for carriers.

5. The Transitional Stability Plan Represents a Reasonable Means of Ensuring that Reforms Will Not Result in Significant "Flash Cuts" of Support.

As part of the RLEC Plan, the Rural Associations proposed a "Transitional Stability Plan" (or "TSP") that would attempt to limit any RoR study area from losing more than five percent (5%) of total USF support from the preceding calendar year for

[39] *Id.* ¶ 1040.

the first three years, with such transitional support phasing out over two additional years thereafter. Although the RLEC Plan already incorporated substantial steps to avoid disruption of support associated with prior investments – including the grandfathering of HCL support and a limitation applicable only to *prospective* investments – the Rural Associations designed and proposed this aspect of the RLEC Plan to safeguard against the potential for "winners and losers" resulting *solely* from the operation of any reforms.

The TSP has several benefits that should be attractive to the Commission as part of its further reforms. First, it is "self-funding," in that any adjustments necessary to carry out the TSP for carriers who would lose support would be "paid for" by reducing on a pro-rata basis the incremental support received by other RoR carriers as a result of reforms.[40] Thus, the TSP would have *no implications whatsoever for the Commission's "budgetary purposes."* Second, the TSP would not "reward" RLECs for "organic" changes to support; that is, changes in USF support that would have occurred in any event under existing rules would not be eligible for TSP adjustments. Instead, the TSP would only provide incremental support to those RLECs who would lose more than five percent of support specifically because of the reforms enacted. Finally, the TSP would be – just as its name asserts – "transitional" in nature. Specifically, for the first three years after taking effect, the TSP would protect an RLEC from losses of more than five percent as compared to the support received by that RLEC in the immediately preceding year. The adjustments available to an RLEC through the TSP would then be reduced by one-third in the fourth year and by two-thirds in the fifth year, such that the TSP would expire altogether thereafter. Given its self-funding nature, the fact it is merely a safeguard

[40] *Order,* Appendix G, new section 54.1104(f).

against changes resulting solely from reform, and its transitional nature, the Rural Associations believe the TSP is a reasonable means of satisfying the Chairman's oft-stated objective of avoiding "flash cuts" in the implementation of any reforms.

C. If the Commission Does Not Adopt the RLEC Plan, Discrete Elements Must be Adopted to Promote Access to Reasonably-Comparable Broadband Services in High-Cost Areas Served by RLECs.

1. The Commission Must at a Minimum Ensure That RLECs Will be Able to Receive USF or CAF Support for the Provision of So-Called "Naked DSL" and Other Standalone Broadband Offerings.

As the Commission is well aware, today's legacy support mechanisms – which will apply to RLECs for the foreseeable future (in reduced form) until a new CAF is in place – limit the availability of USF to those common lines used to deliver regulated local voice services to consumers. This limitation undermines the Commission's stated fundamental objective of reform, which is to "ensure that all Americans are served by networks that support high-speed Internet access."[41] Indeed, as discussed in section II below, the new public interest obligations established by the *Order* revolve primarily around the broadband-based expectations of consumers, even as the shrinking legacy support mechanisms the Commission retains for RLECs in the *Order* discourage and render it very difficult financially for RLECs to provide broadband on a standalone basis to consumers even where desired.[42]

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[41] *Order* ¶ 5.

[42] The Commission contemplates elsewhere in the Order that standalone broadband is a desirable service offering that should be promoted in areas where CAF support is available. *See id*. at note 127 ("Although we do not at this time require it, we expect that ETCs that offer standalone broadband service in any portion of their service territory will also offer such service in all areas that receive CAF support. By 'standalone service,' we mean that consumers are not required to purchase any other service (e.g., voice or video service) in order to purchase broadband service.")

The Commission's Phase I CAF support mechanism appears to envision price cap companies will receive support for delivering broadband-capable networks in unserved areas regardless of whether the customer at each location chooses to procure both broadband and voice, or merely broadband. Indeed, the availability of support appears to have no tether to the purchasing decision of the consumer at all – instead, the Commission will simply make "a one-time support payment of $775 per unserved location for the purpose of calculating broadband deployment obligations."[43] In other words, the support amount ties (appropriately, in the Rural Associations' view) to the act of deploying a broadband-capable network to a given customer, rather than based upon what the customer might choose to buy once that network is in place.

Thus, in the event the Commission fails to adopt the RLEC Plan for broadband support, it should at a minimum insure consumers in rural areas served by RLECs have the same opportunity to procure broadband on supported networks as those in price cap-regulated areas. Failure to move with all due speed to adopt and implement support for standalone broadband in RLEC areas disadvantages consumers in these areas and will only exacerbate the new "rural-rural" divide that is likely to emerge. Moreover, the cause of broadband adoption is hardly served by an artificial regulatory construct that compels the customer to buy voice service to obtain affordable broadband. It is therefore of the utmost priority the Commission enable the prompt funding of so-called "naked DSL" or other standalone broadband services offered by RLECs.

This could be accomplished in a straightforward manner through a simple modification to existing support programs, using the current ICLS mechanism as a

[43] *Id.* ¶ 139.

guidepost. Specifically, ICLS today helps to cover the 25 percent of loop-related costs that are assigned to the interstate jurisdiction, subject to a $6.50 per month per line "benchmark" in the form of the Subscriber Line Charge ("SLC"). Extending this same framework, standalone broadband could be supported by funding the difference between 100 percent of the loop-related costs of such service (because that loop is by definition used only for an interstate service) and a $26 per month per loop benchmark ($6.50 multiplied by 4 to ensure a comparable offset to the SLC in ICLS). This higher benchmark would help encourage providers to manage loop costs and obtain reasonable cost recovery from customers, while also ensuring support is available for RLEC consumers who wish to migrate to broadband without being compelled to take legacy voice service as well.

2. Middle Mile Costs Should be Eligible for Cost Recovery Through USF/CAF Support.

Most RLECs do not own or control Internet nodes, and are generally located tens or hundreds of miles from the Internet backbone. Since a significant portion of rural broadband costs derive from middle mile expenses, adequate CAF funding for RLEC-provided broadband must include recovery of such costs.[44] At the same time, the Rural Associations recognize the imperative to ensure these costs are incurred within the most efficient sets of parameters. Accordingly, the Rural Associations propose the following principles to attend recovery of middle mile costs.

In the first instance, the middle mile should be defined as the facility that extends from the Access Service Connection Point ("ASCP") to the nearest practical and most

[44] Middle mile costs appear to be included within the total costs of the broadband-capable networks to be supported by the models applicable to price cap-regulated areas. *See, e.g.*, *id.* at note 238 (discussing what the effect of unsubsidized competition might be on supported middle mile facilities for CAF recipients).

efficient next-tier Internet Network Access Point ("NAP"). Under this approach, an RLEC would be constrained to those NAPs with which connection can be obtained in an efficient manner, and the RLEC would generally be unable to recover costs associated with a more distant NAP. In some instances, however, bypassing the more geographically-proximate NAP would be justified. For example, many RLECs are members of jointly-owned networks.[45] In such situations, RLECs should not be precluded from using that jointly-owned network (even if there is a closer NAP) if there is a reasonably acceptable cost differential between the two networks, since an RLEC's use of a jointly-owned network can realize cost-savings in other areas supported by the viability of the jointly-owned facility, as well as other intangible benefits that may not be reflected discretely in middle mile costs.

In addition to the distance between facilities, middle mile costs are driven by the costs of capacity RLECs must obtain in order to meet consumer demand, or Commission requirements, or both. Currently, the Commission has established "4/1" as a minimum requirement. The costs of the capacity needed to provide that level of service should, without question, be eligible for recovery. In some instances, however, end-user demand may necessitate the purchase of additional middle mile capability to support greater consumer or especially business demand.[46] Accordingly, the Rural Associations submit that reasonable limitations on middle mile costs can be obtained by aligning cost recovery to the minimum speed requirements ordered by the Commission.

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[45] *E.g.,* Letter from Joshua Seidemann, NTCA, to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al.* (filed June 16, 2011); Letter from Joshua Seidemann, NTCA, to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al.* (filed July 18, 2011).

[46] *See Rural Associations April 18 Comments* at 29-30.

Beyond transport to the NAP are the costs of access/capacity. Large variations in the costs of access/capacity can result from the remoteness of a service area, or the inability of an RLEC to reach a Tier 1 ISP. Therefore, the Rural Associations submit that access/capacity should be included within the range of eligible cost recovery elements for middle mile.

Additional controls on recovery can also derive from a properly-established oversubscription ratio.[47] The OBI model,[48] as well as NECA,[49] have supported an oversubscription ratio of 15:1. Any middle mile constraint must permit adjustments to capacity to support changes in required speeds. An increase in download requirements from 4 to 6 Mbps, for example, would require providers to obtain additional capacity. A capacity constraint must also recognize that transport providers ordinarily sell capacity in 10 Mbps increments. Therefore, cost recovery must accommodate rounding up to the nearest 10 Mbps increment.[50] Moreover, since the only way to obtain necessary transport capacity in those instances would be by obtaining capacity to the next 10 Mbps increment, those costs are necessary and incurred unavoidably in fulfillment of Commission policies.

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[47] *I.e.*, the ratio of capacity offered to end users versus actual middle mile capacity. Since not all end users simultaneously utilize shared middle mile facilities, a reasonable oversubscription ratio permits cost savings without unreasonably reducing the speed and quality of services provided to end users.

[48] *See OBI Broadband Availability Gap Paper* at 94, and 113, Exhibit 4-BT.

[49] Comments of NECA, GN Docket No. 09-47 (filed Nov. 4, 2009) at 10.

[50] The Commission should not be concerned that rounding upward will lead to inefficiencies, since the availability of greater capabilities for end-users should only enhance policy goals promoting broadband adoption and use. On the other hand, as the Commission is well aware, since middle mile services are largely offered on a deregulated basis, constraints on cost recovery may severely limit RLECs' ability to obtain adequate facilities in areas where limited marketplace alternatives exist.

Additionally, cost-recovery mechanisms must accommodate a range of variables. For example, there must be an adjustment process that will permit increases in the allowed middle-mile capacity as the Commission revises minimum broadband capacity requirements upward. Cost recovery guidelines should also recognize that where the number of customers is very small, the capacity calculations described above would not be adequate. It is also possible there are some areas where the traffic patterns require a lower oversubscription ratio. A defined and easily-executed waiver process should exist for these types of situations.

3. The Commission Should Create an IP-Enabled Switching Additive.

The Rural Associations recognize the policy interests in accelerating the deployment of switching equipment that can enable voice communications between end user customers using Internet Protocol (IP). Carrier investment in this equipment, however, will require the dedication of substantial resources that may not be recoverable fully through general CAF ICC mechanisms. As the Rural Associations have previously explained, the Commission adoption of an "incentive-based" regulatory scheme for costs assigned to the interstate switched access jurisdiction means that RLECs who have not yet made the transition to IP-enabled switching are more likely to maintain existing switching equipment in place for as long as possible – the exact opposite of what the Commission is seeking to accomplish in this proceeding. In contrast, RoR regulation for switched services properly incents carriers to invest in upgraded end office equipment such as IP softswitches.[51]

[51] Letter from Michael R. Romano, NTCA, to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al.* (filed Oct. 20, 2011) at 3.

The Rural Associations therefore submit that, as part of a minimum alternative to adopting the RLEC Plan, the Commission should ensure an opportunity for RLECs to obtain "IP-Enabled Additive Support." The amount a carrier would receive in IP-Enabled Additive Support would be equal to the un-depreciated, un-separated revenue requirement associated with IP-Enabled local switching equipment that is greater than the revenue requirement that could otherwise be recovered through CAF ICC support mechanisms. The purpose of this additive would be to encourage and enable greater deployment of IP-Enabled switching facilities by recognizing the potential need to recoup costs associated with deployment of this equipment that are higher than those otherwise recoverable through the new mechanisms. Since this support would go *only* toward enabling and recovering investments in new softswitching equipment after the effective date of the *Order*, the Rural Associations anticipate the Commission will welcome such a proposal as it clearly furthers the Commission's explicit objectives in promoting a migration from circuit-switched technology toward IP-enabled technology.

II. THE COMMISSION SHOULD DEFER APPLICATION OF ANY BROADBAND-SPECIFIC PUBLIC INTEREST OBLIGATIONS AND OTHER NEW MANDATES TO RLECS UNTIL A SUFFICIENT AND PREDICTABLE CAF HAS BEEN ADOPTED FOR THESE CARRIERS.

The *Order* adopts a number of broadband-related public interest obligations for ETCs, including RLECs. Chief among these are requirements that RLECs offer broadband services meeting minimum speed and latency requirements upon "reasonable request,"[52] and that these services be provided at rates that are "reasonably comparable" to those offered in urban areas.[53] In addition, the *Order* requires that all high-cost

[52] *Order* ¶ 206.

[53] *Id.* ¶ 86.

support recipients, including RLECs, test their broadband networks for compliance with speed and latency metrics, and certify and report those results annually.[54] The obligations imposed on RLECs by the *Order* are not matched by the universal service support necessary to make these obligations achievable in RLEC service areas.[55] Rather, as explained in section I *supra*, and further below, the Commission should adopt a sufficient and predictable CAF mechanism for these carriers prior to imposing any further broadband-specific public interest obligations on RLECs, such as the additional and more expensive requirements proposed by the *FNPRM*.[56] The Commission should also decline to adopt other compliance mandates, such as letters of credit or schedules of penalties, until it has adopted, implemented, and examined the further performance of such a broadband-focused CAF. Once an adequate and legally necessary amount of support is made available, the Commission can then revisit the obligations that should attach to such support.

A. The Commission Should Refrain From Developing or Applying Broadband-Specific Service Measurement and Reporting Requirements to RLECs for Both Policy and Technical Reasons.

1. No Broadband-Specific Service Measurement and Reporting Requirements Should Apply Until the FCC Pairs Them With a Sufficient and Predictable Broadband-Specific Support Mechanism.

The *FNPRM* seeks comment on whether the Commission should adopt a specific methodology for ETCs to measure the performance of their broadband services[57] (beyond

[54] *Id.* ¶¶ 109-111.

[55] *December 29 Petition for Reconsideration* at 2-6.

[56] *See FNPRM* ¶¶ 1012-1030.

[57] *Id*. ¶¶ 1013-1017.

those performance-related obligations already adopted in the *Order*).[58] This proposal, however, puts the cart before the horse. Before imposing any broadband-specific measuring and reporting requirements on RLECs – let alone determining the specific methodology for doing so – the Commission needs to consider and adopt a broadband-specific CAF support mechanism that is sufficient and predictable and that enables RLECs to actually provide broadband services pursuant to the contemplated performance metrics.

The Commission expresses concern that, absent performance measurement and reporting requirements, it may lack assurances rural consumers are receiving service that is reasonably comparable to service available in urban areas.[59] Quite frankly, there is a reasonable chance that cuts to RLEC support already adopted in the *Order*, together with the additional reductions proposed in the *FNPRM*, will yield just such an outcome. But mandating a specific level of broadband performance without providing a sufficient and predictable support program that enables such performance does nothing to address this concern.

There is little, if any, empirical basis for the Commission's purported concerns with respect to "accountability" in the RLEC realm. To the contrary, RLECs have long demonstrated their commitment to deploying the best possible level of service they can within the bounds of their financial resources and geographic and demographic challenges. RLECs are typically headquartered in and focused upon the rural areas they

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[58] *Order* ¶¶ 109-111.

[59] In discussing how to implement the performance measurement obligations, the *FNPRM* asks, "[i]f we ease performance measuring obligations on smaller broadband providers, how can we ensure that their customers are receiving reasonably comparable service?" *FNPRM* ¶ 1017.

serve, and are not distracted by substantial urban, regional, national and international markets and business opportunities that compete for their resources in the name of higher profitability. In addition, the availability of high-quality, high-speed broadband connections has spurred broadband adoption, which in turn has provided revenues and incentive for further investment. Therefore, RLECs faced with obligations to serve *all* of their respective service areas have had inherent incentives to maximize customer usage of their networks to obtain economic efficiencies. Finally, as prominent corporate citizens in their communities, RLECs have taken seriously their role in the social compact associated with providing critical communications services. In sum, RLECs have social, business, and regulatory incentives to provide the most robust service possible. The concerns articulated in the *FNPRM* do not reflect the RLEC experience – nor their "commendable" efforts in already deploying advanced networks to date.

But, rather than providing RLECs with a broadband-oriented CAF mechanism sufficient to carry forward their commitment and meet new and further proposed broadband public interest obligations, as discussed in section I *supra*, the Commission has instead paired new broadband-related performance obligations with cuts to existing support mechanisms and proposed additional limits on cost recovery.[60] These cuts and limits threaten the ability of many RLECs to maintain existing broadband services, let alone provide new-standard 4/1 Mbps broadband service upon reasonable request or satisfy other broadband-related performance metrics.

As described in more detail in section I of these Comments, meeting the challenge of sustainable universal broadband in RLEC areas – and compliance with the public

[60] *Order* ¶¶ 210-252, 272-284, 894.

interest obligations contained in the *Order* – will require an RLEC-specific CAF mechanism that is scoped for and "sufficient" to achieve the task. That cannot and will not occur if the Commission continues its current construct, which sacrifices RLEC broadband at the altar of imprudent constraints: "fiscal responsibility" and "accountability" *already exist* in the RLEC portion of the USF, and any need or desire for additional policy-driven controls can be achieved through: (a) surgical reforms such as components of the RLEC Plan; and also (b) contribution reform that reduces *pro rata* obligations while ensuring that more who benefit from the networks contribute to their deployment, maintenance, and improvement. But, even under *current* USF levels, better broadband can be achieved under the RLEC Plan.

The Consensus Framework, which comprised the RLEC Plan and the complementary ABC Plan, achieved such a balance by establishing an initial "budget target" for RoR carriers at $2 billion annually, with flexibility to accommodate an annual budget target of $2.3 billion six years later.[61] While hardly ideal and perhaps still insufficient to ensure true universal service (*i.e.*, 4/1 broadband) throughout the vast portions of rural America served by RLECs, this budget reflected a reasonable compromise that would enable RLECs to continue the responsible "edging out" of broadband consistent with recent historical practice, while still reflecting the Commission's desire for budgetary discipline. In any event, until the Commission adopts

[61] Under the *Consensus Framework*, AT&T and Verizon agreed to defer funding of the CAF for their own study areas for up to two years to the extent that growth in RLEC support from $2 billion to $2.3 billion could not be achieved within an overall High Cost program annual budget of $4.5 billion. *Consensus Framework* at 2. Yet the Commission apparently determined without explanation that this explicit offer by the two largest carriers in the United States for the good of end-users served by the smallest carriers in rural areas was unnecessary.

a "sufficient and predictable" CAF mechanism for RLECs, such as the RLEC Plan or other incremental funding alternatives described in section I *supra*, all broadband performance measuring and reporting requirements should be seen as "unfunded mandates" and suspended for these carriers.

2. The Commission Should Not Impose Any Broadband Performance Measurement Requirements on RLECs Until Technically Feasible and Less Burdensome Testing Procedures Are Available.

Assuming the Commission were to adopt a "sufficient and predictable" CAF mechanism for RLECs consistent with section I *supra*, the Commission needs to address a number of technical and practical concerns prior to imposing broadband-related performance metrics on smaller carriers.

The *FNPRM* proposes to require support recipients to measure broadband speed and latency on their access network "from the end-user to the nearest Internet access point."[62] Installation of a device at an end users' premise would likely not provide an accurate measurement of a broadband connection's actual speed because the quality of customer premises equipment varies widely. [63] In any event, ETCs typically do not have

[62] *FNPRM* ¶ 1013.

[63] For example, the quantity and type of applications running on a computer, the performance of the computer's processor, and the capabilities of the computer's operating system can greatly affect broadband speed measurements. Routers within the customer premises also differ in performance capability. Older routers may not be able to handle sustained 4/1 Mbps broadband rates. Unreliable wireless routers can cause packet loss, which can also reduce overall broadband speeds. In addition, most customer premises have multiple devices accessing the same broadband connection, including computers, gaming devices, set-top boxes, home monitoring devices, video surveillance cameras, environmental monitoring and control, smart grid devices, or a host of other broadband connected devices in the customer premises. The quantity of devices and the number of applications running on these devices can limit the amount of broadband bandwidth available for speed measurements, which could result in unrealistically low results.

access to such equipment within the customer premises, meaning any tests will need to be conducted by devices placed at the network interface device or fiber equivalent.

In addition, the Commission must recognize that an RLEC's nearest Internet access point may be several hundred miles outside of its service area.[64] RLECs typically lease facilities from other providers to transport their traffic to these Internet access points. Speed bottlenecks and congestion in other providers' networks will also adversely affect broadband speed measurements. Finally, the broadband test server itself can negatively affect test results if it is not equipped sufficiently for the tests and user demand. An underpowered server or a server with oversubscribed interfaces may report test results lower than what a customer may actually experience, and indeed may even create slowdowns by utilizing network capacity to conduct speed tests.

It would be inappropriate to base compliance with minimum speed and latency requirements upon the performance of other providers' facilities over which the USF/CAF recipient has no control. Any broadband performance measurement requirement ultimately imposed on RLECs must therefore address only those portions of the network the RLEC (or its commonly-controlled affiliate or subsidiary) actually owns.

Second, measuring broadband network performance in geographically large, sparsely-populated territories, often over difficult terrain, is a significant undertaking – particularly for small companies with limited personnel and financial resources.

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[64] As discussed in section I *supra*, the Commission has yet to provide any support to RLECs for such "middle mile" facilities, notwithstanding the clear acknowledgment from parties across the industry of both the costs thereof and the importance of such facilities in delivering high-speed broadband to end users. *See, e.g.,* Comments of NTCA, GN Docket Nos. 09-47, 09-51, and 09-137 (filed Nov. 20, 2009) at 5-12 (providing data with respect to the costs per Mbps of middle mile transport services); Letter from Alan Buzacott, Verizon, to Marlene H. Dortch, FCC, GN Docket No. 09-51 (filed Nov. 17, 2009) (proposing a means of supporting second mile and middle mile facilities via USF).

Assuming the technical issues noted above could be overcome, RLECs would be required to expend substantial resources to create and maintain the back-office systems necessary to collect and provide to the Commission the speed and latency data requested. This would consume resources far better spent on providing quality service to customers. And, considering the *Order*'s provisions placing greater limits on RLECs' ability to recover operating expenses through high-cost support, the *Order*'s broadband performance measurement requirements may impose additional operating expenses on many small carriers and place upward pressure on end-user rates.[65]

Finally, the Commission must address the nature of the "broadband" services RLECs are expected to provide pursuant to the applicable broadband public interest obligations ***before*** any performance measurement testing and reporting requirements can be imposed. As the Commission is well aware, many RLECs offer common carrier broadband transmission services to their ISP customers. These ISP customers, in turn, provide the retail broadband Internet access services to end-user customers. As the Rural Associations have previously noted,[66] the *Order* does not address how RLECs that do not offer broadband Internet access services directly to consumers can be expected to comply with end-to-end broadband service measurement obligations. The Commission should

[65] Moreover, maintaining this data may raise several privacy issues that the *FNPRM* does not appear to contemplate. Beyond the burden, collecting and maintaining performance-related data may raise several privacy issues that the *FNPRM* does not appear to contemplate. *See, e.g.*, Comments of the Benton Foundation, Columbia Telecommunications Corporation, Consumers Union, Native Public Media and New America Foundation, GN Docket No. 09-158, CC Docket No. 98-170, WC Docket No. 04-36 (filed July 8, 2010) (discussing measurement tools by which consumer privacy concerns might be limited). Even if such issues might be resolvable through certain processes, the FCC should engage in some discussion and resolution of them in lieu of silence on such questions.

[66] *December 29 Petition for Reconsideration* at 5.

clarify how such performance measurements apply in these situations before adopting further requirements through the *FNPRM*.

B. RLECs' Ability to Provide "Reasonably Comparable" Broadband Services at "Reasonably Comparable" Rates Will Depend Upon the Availability of a Sufficient and Predictable CAF Mechanism.

The *FNPRM* seeks comment on components of the voice and broadband rate survey the *Order* requires the Wireline Competition Bureau to conduct.[67] The Rural Associations are pleased the Commission intends to ensure that fixed broadband services and mobile broadband services are not viewed as "comparable services" for purposes of the voice and broadband rate survey.[68] Given the many differences between fixed and mobile services, this is the correct approach. For example, mobile wireless service offerings typically include caps on voice minutes of use and data usage, and mobile wireless broadband services generally operate at much slower speeds than fixed broadband services. Mobile wireless services are also exempt from key regulatory requirements – not the least of which are certain "Open Internet" conditions – that apply to fixed location services.[69] Thus, while mobile wireless broadband services are important to consumers, they are not a substitute for more robust and scalable fixed broadband services. It is therefore appropriate to compare fixed broadband services in rural areas only with fixed broadband services in urban areas.

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[67] *FNPRM* ¶ 1018.

[68] *Id*. note 2145 (stating that, "by limiting reasonable comparability to "comparable services," we intend to ensure that fixed broadband services in rural areas are compared with fixed broadband services in urban areas, and similarly that mobile broadband services in rural areas are compared with mobile broadband services in urban areas.").

[69] *See Preserving the Open Internet,* GN Docket No. 09-191, *Broadband Industry Practices*, WC Docket No. 07-52, Report and Order, 25 FCC Rcd. 17905 (2010).

But regardless of how the rate survey is constructed, the Commission cannot expect carriers operating in rural areas to offer "reasonably comparable" broadband services at "reasonably comparable" rates absent a sufficient and predictable broadband-specific support mechanism that would enable fulfillment of that mandate. It is also questionable from a legal perspective how the Commission can port the concept of "reasonable comparability" under section 254 over from voice to broadband service when it has expressly and purposefully attempted to steer clear from making broadband a "supported service" under the statute. As noted above, the absence of a CAF mechanism that provides specific, predictable, and sufficient support for broadband service, coupled with the *Order*'s cuts to the existing high-cost support mechanisms (and the very real threat of additional cuts in the *FNPRM*), impairs the ability of most RLECs to meet broadband public interest obligations such as those contemplated in the *Order* and the *FNPRM*. Indeed, reductions to the existing high-cost support mechanisms such as those adopted in the *Order* and being further considered in the *FNPRM* will likely place significant upward pressure on both voice and broadband rates in many RLEC territories; indeed, in some cases, the *Order demands* that prices increase, perhaps to a level that may no longer be "reasonably comparable." The Commission should therefore expeditiously adopt a sufficient and predictable CAF mechanism for RLECs that will enable them to make available *all* services consistent with the applicable public interest obligations and at rates and levels of service quality that are "reasonably comparable" to those offered in urban areas. The RLEC Plan would facilitate such a result.

C. The Commission Should Refrain From Imposing any Specific Interconnection Requirements on USF/CAF Recipients Prior to Considering a Broader IP-to-IP Interconnection Policy Framework.

The *FNPRM* seeks comment on a proposal to require CAF support recipients to comply with certain interconnection requirements, specifically IP-to-IP interconnection for voice services.[70] IP-to-IP interconnection implicates a number of complex, technical issues the Commission and the industry are just beginning to evaluate. As the *FNPRM* itself states, to date, the Commission has only just begun to develop a record on this issue.[71] In that regard, the *FNPRM* asks a number of questions intended to inform the Commission's understanding of this critical issue and to ultimately assist its efforts to develop an overall policy framework for IP-to-IP interconnection. Adopting IP-to-IP interconnection rules at this time that are applicable only to CAF recipients will only lead to additional regulatory arbitrage. Bad actors will inevitably attempt to exploit loopholes created by the failure to consider the many issues surrounding an overall IP-to-IP policy framework, such as the scope of traffic covered by that framework or the timing of the transition to all-IP networks. Thus, it would be premature for the Commission to adopt any additional interconnection requirements for RLECs at this time, as it may result in a number of unintended consequences.

D. The Commission Should Refrain From Imposing Special Requirements on USF/CAF Recipients to Make Facilities Available to Community Broadband Networks, and Should Not Adopt a Technology Opportunities Program.

The Commission should decline to require RLECs to make interconnection points or backhaul capacity available to community broadband networks. There is no

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[70] *FNPRM* ¶ 1028.

[71] *Id*. ¶ 1335.

indication in the record that such a requirement is necessary or that community-based entities seeking access to points of interconnection or backhaul capacity lack such access. Indeed, to the contrary, the evidence in the record demonstrates that community anchor institutions already enjoy substantial broadband access, and there is no indication of a problem to be solved with respect to such access.[72] Moreover, numerous projects funded through the National Telecommunications and Information Administration's ("NTIA") Broadband Technology and Opportunities Program ("BTOP") -- together with public-private initiatives such as GigU – demonstrate that incentives and opportunities already exist for high-cost support recipients to partner with communities on a voluntary basis.[73]

Likewise, there is no indication a USF-funded Technology Opportunities Program is necessary or prudent. To begin with, the effectiveness of the CAF mechanism established for price cap carrier areas with regard to the deployment of broadband to unserved areas will not be known for some time. In addition, the FCC has not yet established a CAF mechanism for areas served by RoR carriers. Therefore, it is premature to even consider diverting limited funds from existing high-cost programs to a new pilot program to support community broadband networks. Instead, with so many pieces still to develop in terms of implementing the reforms and the dust hardly settled yet on the measures adopted in the *Order*, the Commission should focus on completing

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[72] *See, e.g.,* Letter from Michael R. Romano, NTCA, to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al.* (filed Oct. 7, 2011); Letter from Michael R. Romano, NTCA, to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al.* (filed Oct. 6, 2011) (discussing the widespread availability of broadband to residents, businesses, and community anchor institutions throughout North and South Dakota).

[73] *See, e.g.*, Comments of Public Knowledge and the Benton Foundation, WC Docket No. 10-90, *et al.* (filed August 24, 2011) at 9 (describing partnership between REACH Michigan Middle Mile Collaborative and last mile providers intended to connect underserved counties in Michigan's Lower Peninsula).

its reform of the High-Cost program and give existing COLRs and other commercial providers the chance to deploy broadband service to unserved consumers.

E. RLECS Have Demonstrated Substantial Accountability In Use Of USF Funds; Additional "Accountability" Mandates Would Only Frustrate Their Ability To Focus On Service Delivery To Consumers.

To date, the accountability record of RLEC recipients of high-cost support has been exemplary. Neither state commissions nor the Commission have revoked, or initiated proceedings to revoke, the ETC designation of any RLEC.[74]

USF audits conducted over the course of several years by the Commission's Office of Inspector General ("OIG") uncovered no significant fraud or misuse by RLECs of USF disbursements in the High Cost Program. In fact, USAC announced in its 2009 Annual Report that final data for the first round of the OIG audit program showed the actual "improper payment rate" for the High Cost Program, associated mostly with questions regarding record retention and rule interpretation disputes, was only 2.7 percent. USAC stated it anticipated final reports for the second and third rounds of the OIG audit program would show "similar results."[75]

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[74] The RLEC Associations are aware of only a single extreme and isolated instance where a state commission was unwilling or unable to make the annual certification required under section 54.314 of the Commission's rules that an RLEC has been using all federal high-cost support received by the RLEC only for the provision, maintenance, and upgrading of the facilities and services for which the support is intended. *See Investigation of the Fiscal and Operational Reliability of Cass County Telephone Company and New Florence Telephone Company, and Related Matters of Illegal Activity*, Case No. TO-2005-0237, Order Establishing Investigation Case (Jan. 14, 2005, Mo. PSC).

[75] Universal Service Administrative Company, 2009 Annual Report at 2, available at: http://www.usac.org/_res/documents/about/pdf/usac-annual-report-2009.pdf.

Over and above their excellent ETC compliance and OIG audit records, RLECs have been industry leaders in deploying both quality voice and broadband services to Rural America. RLECs have responded for decades to the needs and demands of their rural customers for quality voice and broadband services, and have led the way in converting their former voice networks to multiple-use networks. As the RLEC Associations have repeatedly informed the Commission, RLECs currently offer broadband service to over 90 percent of their rural customers.[76]

In sum, the RLEC industry has been fully accountable for its use of the federal high-cost support distributed to it. There is, therefore, no discernable reason or need for new Commission rules or procedures to increase accountability standards for RLECs, to address RLEC accountability defects, or to add new accountability remedies. Moreover, as discussed below, such measures will impose undue burdens on RLECs and impair their ability to provide service, without generating any public interest benefits.

1. A Requirement to Obtain Irrevocable Standby Letters of Credit Would Adversely Affect the Ability of Smaller Providers to Deliver Universal Service.

The Commission's proposed "first alternative" remedy[77] -- irrevocable standby letters of credit ("LOCs") similar to the model set forth in Appendix N to the *Order* – highlights these concerns. Most RLECs are small businesses that do not have the

[76] *See, e.g.,* Joint Reply of the NECA, NTCA, OPASTCO,WTA, and the Rural Alliance, WC Docket No. 10-90, *et al.* (filed Aug. 11, 2010) at 16; Comments of NECA,OPASTCO, WTA, WC Docket No. 10-90, *et al.* (filed Aug. 14, 2011) at note 75. The two most difficult and expensive hurdles for RLECs to clear in order to offer the Commission's proposed 4/1 broadband standard are deploying the fiber upgrades necessary to provide 1 Mbps speeds upstream and obtaining sufficient middle mile capacity from unrelated carriers between their service areas and the closest Internet nodes.

[77] *FNPRM* ¶¶ 1105-1109.

financial resources or the established relationships with major banks that would enable them to obtain anything remotely resembling the Commission's model LOC. The primary lender for the RLEC industry is the Rural Utilities Service ("RUS"). The RLEC Associations know of no provision in the RUS enabling statutes or the RUS regulations that would enable RUS to provide substantially similar LOCs to RLECs (or any subset of existing RUS borrowers) or to allow the Commission to draw immediately upon such LOCs in the event of the RLEC's non-compliance with Commission accountability standards.

The next largest lenders to the RLEC industry are the Rural Telecommunications Finance Cooperative ("RTFC") and CoBank. These entities have traditionally provided financing to RLECs predominately for exchange acquisitions and for infrastructure investment projects – both of which transaction types entail the acquisition of substantial additional collateral that can be seized and sold by the lender, if necessary, to recover much or all of any unpaid principal and interest in the event of a loan default. RTFC and CoBank can speak for themselves, but it is difficult to envision they would be willing to provide irrevocable standby LOCs to RLECs for substantial amounts that could be demanded by, and paid directly to, USAC or the Commission without any legal process or any opportunity to review the current financial status and collateral of the RLEC.

Finally, RLECs maintain business accounts in local banks to accumulate customer, USF and ICC revenues, and to pay employees, vendors and government agencies. These banks are predominately small local community banks or branches that are unlikely to have experience with irrevocable standby LOCs, or the interest and resources to furnish them.

In sum, most RLECs are small businesses that will not be able to obtain the irrevocable standby LOCs contemplated by the Commission from any of the institutions with which they have established financial relationships. If such LOCs are mandated as a condition for receiving high-cost support, many RLECs whose rural service areas and customers need federal support the most will be precluded from participation in the USF program.

In those rare instances where an RLEC might be able to obtain an irrevocable standby LOC – for example, from a large national or regional bank – such a LOC will be very expensive. Banks charge for issuing such letters, and their price will depend upon the likely amount of recovery that might be demanded by the Commission/USAC and the risk the bank will have to advance the funds immediately without any chance to review the RLEC's then-current status or to negotiate current interests rates, collateral, and other terms and conditions with the RLEC. It is likely RLECs will have to pay at least several basis points with respect to the amount of the LOC, and additional points or fees each time they need to renew it. It is also likely RLECs will have to pay significant legal fees for the negotiation and renewal of such LOCs, and in many cases will also have to reimburse the issuing bank directly or indirectly for its legal fees.

Substantial bank fees and legal fees for the proposed LOCs constitute an unnecessary and unreasonable hardship for RLECs at a time when the new rules and mechanisms adopted in the *Order* are significantly reducing their USF and ICC revenue streams, and when the proposals under consideration in the *FNPRM* threaten further decreases thereof. For the few RLECs that might be able to obtain LOCs, the bank fees and legal fees spent on them could be much better and more productively used for the

capital expenditures and operating expenses still needed to improve, maintain and operate their networks. It makes no sense for RLECs to be required to incur substantial new bank fees and legal fees for LOCs at a time when the Commission is trying to reduce corporate operations expenses and to target more support to improve voice and broadband services in rural areas.

The proposed irrevocable standby LOC will also make it more difficult and more expensive for those RLECs that can obtain one to qualify for future infrastructure investment loans. The amount of the required LOC will count as a potential liability or funding commitment of the RLEC. It will reduce the amount of the net assets upon which the lender can rely, and as a result will increase both the risk and the interest rate associated with potential RLEC infrastructure loans.

Even if irrevocable standby LOCs were readily available to RLECs at affordable prices, they would nonetheless pose serious and substantial due process questions under sections 553 and 554 of the Administrative Procedure Act ("APA"), 5 U.S.C. §§ 553, 554. Affected RLECs need to receive appropriate notice of allegations or investigations regarding their compliance with provisions of the Act and Commission rules, to be afforded a fair opportunity to review evidence relied upon by the Commission or USAC, and to present evidence of such compliance or of extenuating circumstances. These basic due process requirements will be violated if the Commission or USAC is permitted to seize funds from a LOC without any opportunity for the affected RLEC to be notified and to defend its conduct.

In sum, the majority of RLECs will be unable to obtain the type of irrevocable standby LOC proposed in the *FNPRM* under most conceivable circumstances, whereas

remaining RLECs will be able to obtain them only at substantial expense and limitation of their future ability to obtain loans for infrastructure investments. The Commission has provided no explanation or evidence regarding what conditions or circumstances have changed that would require RLEC small businesses receiving high-cost support to furnish irrevocable standby LOCs when most have been receiving such support without incident for more than two decades. To the contrary, LOCs make far more sense where a new entrant is proposing to construct facilities in circumstances where there is no proven track record of performance that would provide reasonable assurance of success or demonstrated long-term commitment to area in which the investment is made. The Commission likewise has given no indication it has considered the cost and burden of such LOCs on RLECs and other small businesses, or less burdensome and less expensive alternatives. Finally, the very concept of an irrevocable standby LOC that can be seized by the Commission or its agents without appropriate notice and opportunity for the affected RLECs to be heard raises substantial due process questions.

2. It Would be Premature to Compile a Schedule of Penalties While the Rules are Still Being Examined, Developed, and Understood.

Revocation of ETC designations and denials of section 54.314 certifications (resulting in prospective losses of support) are significant deterrents to rule violations that do not need to be bolstered by indentifying specific additional penalties up front. Given the number and complexity of the rule changes adopted in the *Order* and proposed in the *FNPRM* as well as the large variations in the size, scope and financial resources of the entities likely to receive future high-cost support, it would be premature for the Commission to adopt at this time a specific list or structure of the monetary penalties to be assessed for failure to meet public interest and other obligations. Neither the

Commission nor ETC recipients are fully aware at this time of the implementation difficulties, unforeseen consequences, misinterpretations, misunderstandings, and common ministerial violations likely to arise with respect to the new and modified rules and mechanisms. Actual and continuing experience with them may result in modifications, clarifications, exemptions, waivers and interpretations that change the nature and consequences of actions that may or may not be considered to be violations warranting penalties at this time.

In addition, the wide range of potential high-cost support recipients – from large carriers with millions of customers and billions of dollars of net income to small carriers with less than a hundred customers and little or no net income – renders an equitable scale of penalties virtually impossible. A $50,000 or $100,000 recovery or reduction of support may be wholly immaterial for larger carriers, while having substantial adverse impacts upon the operations and services of smaller ones. Penalties should consider, at minimum, the nature and scope of the violation, mitigating circumstances, the financial resources of the ETC, and the impact upon the rates and services of the ETC's customers. Given the Commission needs to employ notice, opportunity to be heard and other due process protections in determining the factual question as to whether or not an ETC has met its public interest and related obligations, it can readily collect and consider relevant penalty information in conjunction with the compliance phase of its process.

In sum, the compilation of a schedule of penalties or support reductions for noncompliance is premature at this time. Rather than trying to prescribe the consequences of every potential shortcoming or violation in advance, the Commission can address accountability issues on a far more effective and efficient basis if it

investigates and deals with alleged or suspected instances of non-compliance on a case-by-case basis.

III. THE COMMISSION SHOULD LEAVE THE EXISTING 11.25 PERCENT AUTHORIZED RATE OF RETURN IN PLACE UNTIL REVISED RULES GOVERNING THE REPRESCRIPTION PROCESS ARE ADOPTED AND USF AND ICC REFORMS ARE FULLY IMPLEMENTED.

The Commission has determined, based upon a brief review of rates for 10-year Treasury obligations, that the current interstate authorized RoR of 11.25 percent is too high. [78] Accordingly, the *Order* initiates a modified represcription process pursuant to the Commission's authority under section 205(a) of the Act.[79] Via the *FNPRM*, the Commission asks interested parties to submit comments on a number of questions relating to represcription, including information on: determining the weighted average cost of capital ("WACC") for RLECs; RLEC capital structures; whether larger publicly-traded companies such as the Regional Bell Operating Companies ("RBOCs") should continue to be used as surrogates; information on RLEC costs of debt, preferred stock and equity investments; and what factors should be used in determining a "zone of reasonableness" prior to arriving at a final prescription.[80] Although the Commission asks

[78] *Order* ¶¶ 636-640. Commission rules specify the trigger for a new prescription proceeding is tied to the monthly average yields on ten-year United States Treasury securities. *Id.* The Commission, however, has disregarded changes in interest rates for many years and does not explain why it has chosen this particular time to initiate a represcription proceeding.

[79] *Id.* ¶ 641. As part of its Order initiating a represcription proceeding, the Commission waived several Part 65 rules governing service of process and other outdated procedural requirements. *Id.* ¶¶ 641-645. In an apparent attempt to permit represcription of new rate of return concurrently with other rule revisions, the Commission also waived section 65.103 of its rules, which provides for detailed presentation, testing and consideration of evidence relating to rate prescription issues in the form of direct cases, replies and rebuttal testimony. *Id.* ¶ 645.

[80] *FNPRM* ¶ 1056.

a number of questions in the FNRPM relating to the proper method for estimating costs of capital for RLECs, it reaches the tentative conclusion, based on estimates of AT&T's and Verizon's cost of capital, that the authorized interstate RoR for RLECs "should be no more than 9 percent."[81]

The Commission's approach to represcribing the authorized RoR is fundamentally flawed. As NECA, OPASTCO and WTA explained in the *December 29 Petition for Reconsideration*,[82] the Commission has previously determined that traditional methods for analyzing cost of capital for RLECs, based on national interest rate trends and data from non-representative companies like the RBOCs, require updating. Yet the Commission apparently now intends to prescribe a new authorized RoR without either fixing existing rules or establishing any clear replacement methodology.

The Commission cannot lawfully represcribe the authorized RoR in this manner. It must, instead, first establish a represcription methodology that reflects the circumstances RLECs actually face today – not "industry" conditions that prevailed in the 1980s. After such a fair and complete methodology is in place, the Commission must provide interested parties a full opportunity to present and respond to evidentiary showings focused on that methodology. Only at that point will the Commission be in a position to issue a legally-sustainable rate prescription under the APA and section 205(a) of the Act. [83]

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[81] *Id.* ¶ 1057.

[82] *December 29 Petition for Reconsideration* at 26-29.

[83] *Id.* The Commission has been criticized on other contexts for engaging in informal notice and comment rulemaking proceedings that simply propound questions without proposing specific rules. *FCC Process Reform Before H. Subcommittee on*

Despite the Commission's failure to establish clear rules governing submission of relevant evidence, however, the Rural Associations respond herein to the Commission's questions regarding the authorized RoR to the extent possible. The Associations first reference changes in the telecommunications marketplace and regulatory environment that have occurred since 1989, which Commission must consider in represcribing the interstate authorized RoR. Assumptions that may have been valid in the 1980s regarding the impacts and relevance of national interest rate trends, as well as the supposed comparability of RLECs to larger "industry" players like AT&T and Verizon, have clearly become outdated.[84] A paper attached as Appendix B to these comments from Professors Barbara Cherry, of Indiana University, and Steven Wildman, of Michigan State University, further emphasizes the need for the Commission to consider overall

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Communications and Technology, 112th Cong. (May 11, 2011) (Internal Memorandum to Members, Subcommittee on Communications and Technology, from Majority Committee Staff) (Suggesting, among other reforms, that the Commission be required to initiate rulemaking proceedings with a Notice of Inquiry rather than a notice of proposed rulemaking, and to publish specific text for proposed rules rather than asking a collection of open-ended questions or offering a series of alternative approaches), available at: http://republicans.energycommerce.house.gov/Media/file/Hearings/Telecom/051311/Memo.pdf. Since a rate prescription under section 205(a) of the Act requires adjudicatory fact finding, the Commission's failure to develop specific methods governing the gathering of evidence in this proceeding, and its failure to permit parties to proffer such evidence in a focused way (*e.g.,* via presentation of direct cases, replies and rebuttal testimony, along with opportunities for discovery of evidence) is even more glaring.

[84] The *December 29 Petition for Reconsideration* (at 26-29) explains that the Commission cannot merely assume that AT&T and Verizon are comparable in risks to RLECs, but must explain why their risks are comparable and why other companies not selected as comparable have dissimilar risks. *See also Petal Gas Storage, L.L.C. v. FERC*, 496 F.3d 695 (D.C. Cir. 2007) ("What matters is that the overall proxy group arrangement makes sense in terms of relative risk and, even more importantly, in terms of the statutory command to set 'just and reasonable' rates, 15 U.S.C. § 717c, that are 'commensurate with returns on investments in other enterprises having corresponding risks' and 'sufficient to assure confidence in the financial integrity of the enterprise ... [and] maintain its credit and ... attract capital . . . .'" *Id.* at 700, *citing Hope Natural Gas Co.,* 320 U.S. at 603.)

universal service policy directions and the impact of regulatory and marketplace changes in rate represcriptions.

Moreover, the Rural Associations provide information demonstrating the cost of capital for RLECs in the current market and regulatory environment is significantly higher than the Commission's analysis of AT&T and Verizon data would otherwise indicate, justifying continuation of an interstate RoR of at least 11.25 percent, if not higher, for RLECs during the foreseeable future. This information includes an analysis developed by Professor Randall Billingsley, of Wake Forest University, that examines capital costs for a portfolio of firms exhibiting comparable overall risk to RLECs.

As discussed in more detail below, the Commission cannot rely on data of companies like AT&T and Verizon as having comparable risk to RLECs unless it can demonstrate the risks of these two companies are in fact similar to those of RLECs. Professor Billingsley's testimony explains that other companies, when measured on objective terms, in fact more closely resemble RLECs in terms of business risks than these entities and should accordingly be used in any analysis intended to estimate RLEC costs of capital.[85]

Finally, the Rural Associations provide evidence based on RLEC acquisition pricing that also suggests costs of capital for RLECs substantially exceed the Commission's estimates. In light of these findings, the Rural Associations recommend the Commission consider deferring further action on a rate represcription until such time it (a) updates its Part 65 rules or otherwise establishes a clear methodology for determining RLEC cost of capital in today's regulatory and marketplace environment,

[85] Appendix C at 18, Statement of Dr. Randall S. Billingsley, FRM, CRRA, CFA.

and (b) allows the "dust to settle" on the USF and ICC reforms announced in the *Order* (and any further reforms adopted in the *FNPRM*). At that time, the Commission and interested parties will be in a better position to gather factual evidence and analyze comprehensively how changes in the telecommunications, financial and regulatory environments are impacting RLECs and their costs of obtaining capital.

A. The Telecommunications Marketplace and Regulatory Environment Have Changed Drastically Since 1989, Requiring the Commission to Develop New Approaches to Represcribing the Interstate Authorized Rate of Return for RLECs.

The *Order* correctly points out that it has been many years since the Commission has examined the interstate RoR.[86] It has been even longer since the Commission developed rules governing such represcriptions.[87] The telecommunications marketplace and regulatory environment, as well as the overall financial climate, have changed dramatically since that era. A complete catalog of such developments, and an explanation as to how they impact business and financial risks for RLECs, would require hundreds of pages to compile. Some obvious considerations, however, include the following.

Marketplace Changes: The interstate and intrastate long distance toll services that paid substantial originating and terminating access charges to RLECs during the 1980s and 1990s now face competition from "over the top" VoIP providers, wireless services, and cable companies. The result has been a precipitous drop in revenues and demand for traditional switched access services over this period. RLECs' interstate access minutes of

[86] *Order* ¶¶ 639-640; *FNPRM* ¶¶ 1046-1048.

[87] *See Represcribing the Authorized Rate-of-Return for Interstate Services of Local Exchange Carriers*, CC Docket No. 89-624, Order, 5 FCC Rcd. 7507 (1990).

use in the 1990's, for example, dependably grew at a rate of more than 17 percent per year. Current demand for switched access service is declining by approximately 13 percent per year.

Similarly, access lines were growing at a steady rate of about 5-6 percent per year in the 1990s as customers added second lines for fax machines and dial-up Internet services. Today, access lines are *declining* by approximately 5 percent per year as consumers increasingly employ single, multiple use broadband connections for voice, data and video. While demand for DSL lines and wireless backhaul facilities is currently growing, it is uncertain whether this pace of growth will be maintained.

The Economy: The *Order* correctly points out that interest rates are at historically low levels at this time.[88] The yield on 10-year Treasuries was at 2.00 percent on January 4, 2012,[89] as opposed to 7.98 percent on January 4, 1990.[90] However, the history of business cycles and Federal Reserve Board interest rate policies make it certain that interest rates will rise and fall periodically, and that 10-year Treasuries will exceed their current low for much of the 15-to-30 year useful life of broadband lines.

Moreover, even though large companies like AT&T and Verizon can raise capital in the current environment relatively cheaply, that means little or nothing in the RLEC world. No one is rushing to loan to or invest money in RLECs these days, even with the authorized RoR pegged at 11.25 percent. Unfortunately, lenders indicate they have been

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[88] *FNPRM* ¶1046.

[89] U.S. Department of the Treasury, Daily Treasury Yield Curve Rates, *available at* http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield.

[90] U.S. Department of the Treasury, Daily Treasury Yield Curve Rates, *available at* http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=1990.

reluctant to extend new loans to carriers because they are unsure of carriers' abilities to service their debt due to proposals emanating from the National Broadband Plan that changed the regulatory landscape.[91] State Members also confirm that providing support for capital costs is a prerequisite to the continued flow of private capital into telecommunications networks serving high-cost areas, as banks and equity investors must see both past and future investments will be backed by long-term support programs that are predictable over typical loan repayment periods.[92]

While the Commission mentions the difficulties Tribal Nations face in obtaining financing,[93] RLECs do not necessarily have better access to capital than tribal entities. Indeed, most RLECs can go to only three potential sources for investment capital – the Rural Utilities Service, CoBank, and RTFC – and, as noted above, at least 2 of these 3 lenders have indicated some concern about further investments in the RLEC sector.

Investors and lenders recognize that RLECs face an uncertain future as both the marketplace and their existing revenue streams change. Since RLEC investments consist mostly of sunk costs (e.g., copper transmission plant, legacy switches, SONET transport technology) that have little value on the open market, these companies are unable to offer much in the way of collateral or residual values. Indeed, as discussed below, market valuations of RLECs have declined substantially as a result of the bleak business and

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[91] *E.g.,* Comments of NECA, WC Docket No. 10-188 (filed Oct. 15, 2010) at 10; *See, e.g.,* Comments of CoBank, WC Docket No. 10-90, *et al.* (filed Apr. 18, 2011); Letter from Jonathan Adelstein, Rural Utilities Service, to Marlene Dortch, FCC, WC Docket No. 10-90, *et al.,* Attach. (July 29, 2011); Letter from C. Douglas Jarrett, Rural Telephone Finance Cooperative, to Marlene H. Dortch, FCC, CC Docket No. 01-92, *et al.* Attach. (Aug. 10, 2011).

[92] *See Rural Associations' May 23 Replies* at 12.

[93] *FNPRM* ¶ 1059.

regulatory outlooks.[94]

Regulatory Uncertainty: Perhaps the most significant environmental factor affecting RLECs in recent years, and for the foreseeable future, is regulatory risk. RLECs have operated under a regulatory cloud for years as the Commission has considered fundamental changes to its universal service and ICC policies. The Commission's current claims that the USF and ICC reforms announced in the *Order* will provide RLECs with greater certainty and predictability[95] are speculative and highly premature, particularly since so many aspects of regulatory reform remain to be implemented.[96]

These issues are explored in detail in the attached paper by Professors Cherry and Wildman. Cherry and Wildman recognize that the Commission's task in prescribing a RoR that maintains balance between universal service reform and the need for service stability is complex. A rate set too low may satisfy constitutional standards, yet still result in major service disruptions to consumers. In this regard, rate prescriptions, like many "bilateral" regulatory mechanisms, require proper matching of obligations and government assurances.

Unfortunately, actions taken in the Commission *USF and ICC Order* – in particular the mismatched imposition of increased service obligations and decreasing support – undermine such assurances. RLECs face significant regulatory threats as the Commission considers cutting off or reducing support in portions of service territories

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[94] *See infra* pp. 57-60.

[95] *Order* ¶¶ 286, 291, *et seq.*

[96] *See* Letter of NTCA, OPASTCO, and WTA to Hon. Thomas J. Vilsack, Secretary, U.S. Department of Agriculture (dated Jan. 12, 2012) (noting the "regulatory overhang" created by the *FNPRM* and additional steps still required to implement the Order).

considered competitive, without necessarily reducing COLR obligations. While RLECs are eager to expand broadband service offerings, there is significant marketplace risk associated with such services.

Another major change that needs to be considered is the 180-degree "about face" in ICC policy, from a Calling Party Pays regime to a regime that will ultimately price all switched access services at zero. With minor exceptions, such as Extended Area Service, RLECs have operated under regulatory plans that have included reimbursement of their costs for originating and terminating interstate calls for about one hundred years. This policy began with Bell System settlements during the early 20th Century and continued with access charges after the 1984 Bell System divestiture, and was modified to encompass reciprocal compensation after adoption of the 1996 Act. It is now slated to disappear before the end of the current decade, and with respect to some categories of traffic, has disappeared already.

Moreover, while there is an Access Recovery Mechanism ("RM") provided for some segments of these costs, it has not yet been established for *all* portions of the rate elements the Commission indicates must ultimately go to zero. By virtue of its automatic reductions, the RM is ticking down to a moment when some level of switched access costs will become unrecoverable. It may well be impossible to estimate what impact this shift will have on RLEC businesses in the coming years, yet the *FNPRM* appears to adopt a "business as usual" approach to represcription.

If the Commission does prescribe a new RoR for RLECs, it should set the revised RoR firmly in the upper range of a broad zone of reasonableness. As Professors Cherry

and Wildman note, doing so would be consistent with prior Commission precedent.[97] They also explain that the case for "erring on the high side" is even more compelling in today's environment.[98] Further, Professors Cherry and Wildman present a model which seeks to quantify the extent to which changes in the regulatory and competitive landscape necessitates prescription of a higher rate of return relative to a prescription than might have been considered reasonable under prior regulatory and marketplace conditions.[99]

B. Available Data Demonstrates the WACC for RLECs Justifies an Authorized Rate of Return of at Least 11.25 Percent; Consequently the Commission Should Consider Deferring a Formal Represcription Process Until USF and ICC Reform Issues are Fully Resolved.

As the Rural Associations have shown, traditional methods of determining cost of capital are inadequate for the purpose of determining an interstate RoR for rural carriers given the massive changes the industry has undergone since the last represcription hearing and continues to experience in an uncertain economy. Nevertheless, the Rural Associations have undertaken to conduct analyses of cost of capital using the best available information, taking marketplace and regulatory changes and uncertainties into account as reasonably necessary.

At the request of the Rural Associations, Prof. Billingsley used a Capital Asset Pricing Model ("CAPM") approach to estimate the WACC for RLECs. Professor Billingsley selected twenty companies to mimic the risk profile of small RLECs based on

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[97] Appendix B at 8-11.

[98] Professors Cherry and Wildman also point out that as price cap LECs continue to evolve, there is little, if any, remaining basis for assuming these companies provide an appropriate surrogate for making determinations about RLECs cost of capital. The Commission clearly recognizes difference in financial risk between these groups of carriers, as illustrated by among other things the bifurcated design of both universal service and ICC reform for each. *Id.* at 8.

[99] Appendix B at 11-22.

available rural telephone company data going back five years. Using this RLEC comparable firm portfolio and industry standard data,[100] and after adjusting for firm size to account for the lack of surrogates for small rural telephone companies, Prof. Billingsley estimates the cost of equity capital for the average RLEC is at least 13.35 percent and the WACC at least 11.48 percent for RLECs. Professor Billingsley's model, analysis, and explanation of his process can be found in Appendix C.

In addition to traditional CAPM methods used by Prof. Billingsley, reasonable estimates of RLECs' costs of capital can also be developed by examining acquisition pricing for rural telephone companies and properties. This approach would rely on a simple annuity-like formula to estimate costs of capital. An annuity formula assumes a person deposits a certain amount of money in a bank, say $100. If the bank interest rate is 10 percent per year, and the depositor only withdraws the interest each year, he would receive a $10 cash flow each year, forever. The interest rate can also be derived by dividing the annual withdrawal by the principal amount ($10 per year/$100).

A similar calculation can be performed to estimate a market-based cost of capital for RLECs, by dividing current free cash flow by the value of the firm. That is, V=FCF/ r, where FCF is free cash flow, r is the cost of capital and V is the value of the regulated firm. The value of r can be derived by dividing free cash flow by value (FCF/V). To do this we need estimates of FCF and V.

A common practice for valuing wireline telephone operations is to examine prices paid per line in RLEC acquisitions. That is, V can be determined by estimating a price

[100] *E.g.,* Risk-free rate of 2.72% is the average yield to maturity on 20-year U.S. treasury bonds during November 2011 according to *2011 Ibbotson Stocks, Bonds, Bills, and Inflation (SBBI) Valuation Yearbook*, 2011, Morningstar.

paid per line (P) and multiplying it by the number of lines in the transaction (L). The price per line accounts for current and prospective market and regulatory factors that influence the value of the transaction. For example, the sale price will take into account the level and risk associated with future free cash flow estimates. The price will also factor in possible tax shields and regulatory effects.

One issue associated with using price per line to estimate cost of capital for regulated services is whether the purchase price for recent transactions includes the value of non-regulated services. This is likely to happen. As a result, FCF divided by an inflated P will understate the true cost of capital.

A more difficult issue is what price per line to use for the calculations. Verizon recently sold a number of its rural exchanges to Frontier at a price averaging about $1800 per line.[101] RLEC lines may be more valuable than price cap companies' rural lines for at least two reasons. First, RLEC lines are in better shape because these companies have heretofore focused their full attention, investment and maintenance upon their rural exchanges. Second, as a price cap company, Verizon has until now faced greater marketplace risks. On the other hand, per-line prices for all carriers have been decreasing rapidly in the face of uncertain national and international economic conditions as well as technological changes that are disrupting telecommunications and other markets.

The current FCF may not be representative of future FCFs. If RLECs win wireless backhaul contracts, for example, their FCFs may trend upwards, while if they lose significant backhaul contracts, FCF will trend downwards. Since both the numerator

[101] Matt Davis, *Verizon Sells Most of Its Remaining Rural Footprint to Frontier, Forbes Custom.com*, available at http://www.forbescustom.com/TelecomPgs/idcnews/6.22.09/VerizonFrontierP1.html.

and denominator of the ratio, FCF/V, are uncertain and may likely move together, we can pick either one as the basis for a sensitivity analysis. The one chosen here is price per line.

Rather than trying to address each of these issues on a case-by-case basis in the context of each recent sale, a reasonable alternative approach would be to look at a range of sale prices. Since 2008, sale prices for RLECs and price cap exchanges suggest a range between $3200 and $1500 per line.[102] Sales prices in prior years were considerably higher, and the likelihood of continued decline in P is not unreasonable. Therefore, it appears reasonable to use a $2500 to $1200 price-per-line range to produce cost of capital estimates.

Free cash flow estimates were calculated for 633 cost companies that responded to a special NECA data request for 2010 regulated financial data.[103] Each respondent's lines were multiplied by an estimated price to develop a value for the company's regulated operations. Because there are CapEx outliers in the data, median values were used to estimate the cost of capital.

The results, using the formula described above, are shown in the following table:

Price per Line	**Median Value for Cost of Capital**
$2,400	**11.75%**
$2,100	**13.42%**
$1,800	**15.66%**
$1,500	**18.79%**
$1,200	**23.49%**

[102] *Id.* *See also* FairPoint Communications, Inc., Form 10-K (Dec. 31, 2008) (purchase of 1.6 million access lines for approximately $1700 per line); Qwest Communications International, Inc., Form 10-K (Dec. 31, 2011) (purchase of 8.8 million access lines for approximately $2500 per line). Additional information on acquisition pricing obtained from informal discussions with JSI Capital Advisors, LLC.

[103] Such a large data set eliminates company-specific risk caused by unanticipated events specific to a particular study area.

On the basis of this analysis, the median RLEC cost of capital appears to range from 11.75% assuming a relatively high price per line ($2400) to 23.49% at a relatively low price per line ($1200). In all cases, the cost of capital is higher than the current authorized rate-of-return, in some cases substantially higher.

This appears to reflect a rational marketplace assessment by investors of the marketplace risk associated with RLEC operations in the current environment. Indeed, given the marketplace uncertainties as well as regulatory risks posed by various factors, including reforms to existing USF and ICC mechanisms underway in this proceeding (which, as noted above, consist almost entirely of cuts and reductions to existing programs), it is not clear why any investor would pour additional money into a small rural telephone company without the potential for significant upside returns. In any event, this market-based analysis contravenes the conventional view (reflected in the Commission's Part 65 rules as well as the *FNPRM*) that broad marketplace and economic trends, such as low spot-market interest rates, meaningfully affect the true cost of capital for RLECs.

These calculations, when combined with the many substantial marketplace and regulatory uncertainties described above, strongly support a need for caution on the Commission's part. As noted above, many of these uncertainties might be lessened, one way or another, as the Commission proceeds to implement a new CAF mechanism for RLECs and ICC reform measures begin to take hold. In light of these circumstances, as well as the significant procedural concerns raised in the *December 29 Petition for Reconsideration*, the best course of action for the Commission would be to defer further action on this matter and revisit the RoR only after the market has had time to adjust to

changes effectuated in the recent *Order* and further changes adopted as a result of the *FNPRM*.

C. The Burden of Proof with Respect to a New RoR Lies with Those Seeking a Change in the Authorized Rate.

The *FNPRM* does not address a critical question regarding the burden of proof in this proceeding – specifically, who bears the burden to demonstrate the existing RoR is unjust and unreasonable and what level of new return on investment would be just and reasonable? Because neither RLECs nor the Rural Associations are seeking a higher RoR, under Commission precedent they do not have the burden of proof with respect to a new RoR represcription. Rather, those entities asserting that a lower RoR is justified must provide sufficient evidence supporting such a lower RoR and also establish on the record that their proffered RoR is just and reasonable under section 205(a) of the Act.[104]

Here, the Commission has indicated the existing 11.25 percent RoR may no longer be just and reasonable, and suggests it should be replaced with a lower RoR.[105] These tentative findings do not exempt parties seeking a lower rate from meeting their burden of proof.

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[104] For example, in a case where AT&T filed tariff revisions proposing a higher RoR and higher prices for interstate calls, the Commission assigned AT&T the burden of going forward with the evidence supporting such changes and the burden of persuasion, in accordance with section 204(a)(1) of the Act. *AT&T Co. Charges for Domestic Telephone Service*, Memorandum Opinion & Order, 27 FCC 2d 151 (1971) ¶ 24. *See also, American Television Relay, Inc. Refunds Resulting from the Findings and Conclusions in Docket 19609,* Memorandum Opinion & Order, 67 FCC 2d 703 (1978) ¶ 10; *800 Data Base Access Tariffs and the 800 Service Management System Tariff*, Order Designating Issues for Investigation, 8 FCC Rcd. 5132 (1993) ¶ 44. Even when rate increases are not sought, a carrier seeking a "rule or order from the Commission approving or prescribing a [new] charge, regulation, classification or practice the carrier would have the burden of proof." *Amendment of Part 61 of the Commission's Rules Relating to Tariffs and Part 1 of the Commission's Rules Relating to Evidence*, Memorandum Opinion & Order, 40 FCC 2d 149 (1973) ¶ 9.

[105] *FNPRM* ¶ 1056.

This result is consistent with ratemaking decisions of other federal agencies such as the Federal Energy Regulatory Commission ("FERC"), which requires proponents of a rate change – including its staff – to bear the burden of proof justifying such a change.[106] The D.C. Circuit has likewise held that a utility does **not** bear the burden of proof on issues where it seeks to maintain the status quo even though its overall filing was for rate increases.[107]

The information provided in prior sections makes clear the current interstate authorized RoR is reasonable, notwithstanding the recent historical lows in short-term or medium-term interest rates. In particular, RLECs face dramatically more risk now, and for the foreseeable future, than at any time in decades. But inasmuch as RLECs are not seeking a change in the authorized RoR, the Commission may not demand that RLECs carry the burden of proving that the existing authorized rate remains fair, or find that RLECs have failed to meet such burden.[108] In the event no party seeking a downward adjustment in the RoR carries its burden of proof, the *status quo* must remain in effect.[109]

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[106] *Kern River Gas Transmission Company*, Initial Decision, Docket No. RP04-274-023, *slip op.*, at 46 (FERC, April 12, 2011). *See also, Colo. Interstate Gas Co. v. FERC,* 791 F.2d 803, 807 (10th Cir. 1986), *cert. denied*, 479 U.S. 1043 (1987); *Tenn. Gas Pipeline Co.,* 94 FERC ¶ 61,117, at 61,447 (2001) (stating the pipeline has the burden of proof on the throughput used to design its rates); *Southern Company Services, Inc.,* Opinion & Order on Initial Decision, Docket Nos. EL91-29-000 and EL94-85-000, *slip op.* at 1, (1998). *Association of Oil Pipe Lines v. FERC*, 83 F.3d 1424, 1431 (D.C. Cir. 1996).

[107] Moreover, when FERC sought a change in existing rules governing allocations of certain costs, the agency itself was held to bear the burden of proof. The court held that FERC "erred in (1) placing the burden of proof on the opponents of the change in cost allocation rather than upon itself and (2) failing to make the findings that the existing zone rates legally in effect were unlawful." *New York PSC v. FERC*, 642 F.2d 1335, 1345 (D.C. Cir. 1980).

[108] The law is clear the Commission cannot assign the burden of proof to the RLECs and then merely observe they failed in their burden. An agency cannot use the assignment of the burden of proof to avoid the responsibility of reasoned decision-making. *Southwestern Bell Telephone Co. v. FCC*, 28 F.3d 165, 172 (D.C. Cir. 1994), *citing*

If, despite all the above, the Commission elects to prescribe a lower RoR, it should not reduce the current cap on HCLS by a corresponding amount as suggested in the *FNPRM.* RoR companies began forgoing HCLS support in 1993 when the fund was initially capped. HCLS support amounts have continued to decrease, especially over the last few years as the Commission has adjusted the HCLS cap downward due to low inflation and loss of access lines.[110] By lowering the cap further, the Commission continues to penalize RoR companies that can no longer absorb additional cuts to their support. There is no need to compound these effects by additional adjustments to the RM due to changes in the authorized RoR.

IV. THE COMMISSION'S PROPOSED REGRESSION MODELS WILL NOT ACHIEVE ACCURATE OR APPROPRIATE LIMITS ON CAPITAL INVESTMENT AND OPERATING EXPENSES.

In the *Order* the Commission decided to limit RoR carrier capital investment and operations expense amounts used to obtain HCLS,[111] in addition to the existing overall HCLS cap. Rather than specify a type of limit that has been used in the past, the Commission decided to employ quantile regression analyses that use a dependent variable based on study area loop costs in each account, and a number of independent

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Kansas Gas & Elec. Co. v. FERC, 758 F.2d 713, 721 (D.C. Cir. 1985). The court added, "[i]f an agency can reject an econometric study merely by observing that it employed unproven assumptions (and that the outside party bore the burden of proof), then no party with the burden can ever prevail." *Southwestern Bell, id.* In other words, the FCC cannot simply pick its favorite RoR and then claim it is justified because the RLECs failed to prove another RoR was reasonable.

[109] *MCI Telecommunications Corp. v. FCC*, 627 F.2d 322 (D.C. Cir. 1980) (holding tariff rates not found to be either just and reasonable or unjust and unreasonable would remain in effect pending completion of the proceeding to determine just and reasonable rates).

[110] *Order* ¶¶ 258-259.

[111] *Id.* ¶¶ 214-20.

variables based on study area data such as number of loops, number of households, urban-rural designation, and percentage quantity of water.[112] The *FNPRM* requests comments on specific aspects of these models.[113]

The Commission acted prematurely by deciding in the *Order* to employ quantile regression methods to limit reimbursement of capital and operating expenses. Several of the Rural Associations have previously sought reconsideration of the Commission's decision to employ such models without having first put the specific proposals out for review and comment.[114] Since the *December 29 Petition for Reconsideration* was filed, the Rural Associations have completed further analyses of the Commission's proposed models. The Rural Associations have also asked Dr. Roger Koenker, whom the Commission itself has hailed as the father of quantile regression analysis,[115] to examine the Commission's use of quantile regression models to limit amounts in individual accounts. As discussed below, these analyses by the Rural Associations and by Dr. Koenker demonstrate the Commission's use of quantile regression analyses is flawed and will lead to serious distortions in support if applied to HCLS or other USF calculations.

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[112] *Order*, Appendix H.

[113] The Commission also decided to employ regression analyses to limit ICLS payments, but did not propose a specific methodology. *FNPRM* ¶¶ 1085-88. The *FNPRM* instead asks whether the Commission should (1) run a single regression analysis on the total interstate revenue requirement for each carrier, and (2) use the decrease in cost per loop resulting from the HCLS limitation and apply it to ICLS revenue requirements. *Id.* ¶ 1087. For the reasons described in this section, the regression analyses proposed by the Commission should be applied to neither HCLS nor ICLS.

[114] *December 29 Petition for Reconsideration* at 9-12.

[115] *Order,* Appendix H ¶ 8 ("Quantile regression, developed by Roger Koenker and Gilbert Basset in 1978, is a good solution to address these problems.")

A. Technical Errors in the Regression Models Will Lead to Serious Distortions in Universal Support Payments.

The *December 29 Petition for Reconsideration* demonstrated that the Commission should, as a matter of administrative law and good policy, reconsider its decision to adopt caps based upon a quantile regression analysis before fully analyzing and taking adequate comment on whether they are feasible and will serve their intended purpose.[116] In these comments, the Rural Associations demonstrate there are a number of technical errors in the Commission's proposed regression analyses that will cause them to limit reimbursement of capital and operating expenses in an arbitrary and capricious manner, resulting in serious shortfalls in HCLS payments. These issues, which are summarized below and described in detail in Appendix D, warrant replacement of the proposed models with more reasonable mechanisms, such as the limitations proposed under the RLEC Plan.

1. Geographical Mapping Data Underlying the Models Are Substantially Inaccurate.

To assign census data to study areas, the Commission relies on software to map geographical census block boundaries to estimated study area boundaries. Both the estimated study area boundaries and the mapping of census blocks to study areas contain significant inaccuracies. As shown in Appendix D, subsection A, significant errors occurred in ***more than 90% of the study areas*** for which data are currently available.[117] Subsection A of this appendix also shows that correlations upon which the quantile models rely are in turn seriously eroded for the group of companies whose census block boundary mapping is inaccurate. Unless extraordinary efforts are undertaken to correct

[116] *December 29 Petition for Reconsideration* at 9-12.

[117] Appendix D at 2-7.

these inaccuracies, the analyses conducted by the Commission will incorporate substantial errors from the start and result in caps with no valid statistical tether to their intended purpose.

2. The Commission's Application of Statistical Estimates to Administer Limitations Fails to Exclude Only Excessive Costs.

The stated purpose for use of a quantile regression methodology is to ensure companies "do not receive more support than is necessary to serve their communities."[118] Each of the Commission's quantile models analyzes cost data for an account reported for USF support purposes. For each study area, each quantile regression analysis is used to limit allowable costs in the account, not to exceed the model's estimate of the 90th percentile of costs in the account for similar study areas.

The 90th percentile is an arbitrary figure that has no demonstrable link to a threshold at which costs become unreasonable.[119] Indeed, the 90th percentile threshold appears to have been plucked from thin air. The Commission has failed to provide a rationale connecting ***any*** percentile with a threshold above which costs might rationally be considered excessive or unnecessary. To the contrary, the explanation provided by the Commission is at once entirely circular and remarkably inconclusive – in short, the 90th percentile was chosen as an excessive cost threshold because it "may" raise questions about whether costs are excessive.[120]

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[118] *Order* ¶ 220.

[119] Although the Commission asks whether the 95th or 85 percentile would be a better limitation factor, *FNPRM* ¶ 1080, absent a logical connection to costs needed to provide service, none of these figures would be any less arbitrary than the 90th percentile, and therefore should also be rejected.

[120] *Order,* Appendix H ¶ 12.

Absent any meaningful, evidence-based, and "data driven" justification as to why costs in excess of the 90th percentile (or any other percentile, for that matter) are unnecessary, the Commission's use of quantile regression analysis in this manner is inherently arbitrary. In fact, no such artificial limit is capable of rationally excluding excessive costs in a way that would comply with the Act's sufficiency mandate.

3. The Commission's Regression Analyses do not Properly Identify Capital and Operating Expenses.

The Commission's quantile regression analyses purportedly seek to limit recovery of both capital and operating expenses by RLECs. However, the Commission's models target *gross investment rather than capital expenses*, and *incorrectly include depreciation expenses in operating expenses*. Furthermore, the Commission's process improperly divorces limits on gross investment from corresponding depreciation expense and depreciation reserves. These errors create two serious problems relating to the regression model's purported application to capital expenses.

First, investment accounts include both embedded investment incurred in the past and new investment placed in service after the rules become effective. Application of a regression limitation to such a mixed account will not accurately place limits solely on future investments and can produce wildly divergent limits on carriers.[121] If the Commission's intent is to ensure that future investment is driven by a need to be efficient in replacing existing plant, [122] the approach adopted by the Commission does nothing to achieve this effect.

[121] Appendix D, Subsection C at 9.

[122] *Cf. Order* ¶ 223 (rejecting the Rural Associations' proposed capital investment constraint because it "would do little to limit support for capital expenses if past

Second, even if the unstated purpose of the quantile regression approach were simply to limit recovery of high investment amounts regardless of when they were made – a result which itself would produce unlawful retroactive impacts and undermine investment incentives – the models do not accomplish even that unstated purpose. This is because the Commission's approach limits only *gross* investment, not *net* investment, which is used to calculate universal service support. The error therefore will produce significant limitations on a study area with relatively large gross investment levels even though its net investment levels, and hence universal service payments, may be relatively low.[123] This error can even lead to producing a negative return on investment, or placing limits on investment accounts that are fully depreciated.[124] Any method of limiting investment must take into account the accumulated depreciation associated with the investment.

4. By Limiting Individual Account Data, the Commission's Proposed Approach to Quantile Regression Analysis Produces Irrational Results.

The Commission proposes to apply quantile regression models to individual account data submitted under current rules for high cost loop universal service support. That data submission includes 58 separate data elements, which are combined into 26 "algorithm lines," which in turn are used to calculate a study area's loop cost. Eleven of the 26 algorithm lines are each limited by its own quantile regression model. An analysis of the effects of these quantile model limits shows that many study areas would have one

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investments for a particular company were high enough to be more than sufficient to provide supported services").

[123] Appendix D, Exhibit 7B.

[124] *Id.,* Exhibit 6.

algorithm line reduced by the regression limit, while other algorithm lines would not be reduced. This has the effect of limiting costs in many study areas, including many that are considered low cost under current rules.[125]

By limiting each account separately without analyzing overall loop costs, the Commission's methodology would undermine investment decisions made prudently on the basis of overall cost analysis. Carriers decide on incremental enhancements to their networks based on numerous considerations. Some may need to replace loop plant with fiber, at a higher initial capital cost, but lower maintenance costs in future years. Another carrier may have relatively newer plant, so it would more rationally invest in updated circuit equipment. Thus, network optimization depends on a variety of circumstances with various levels of costs within each account. Subjecting carriers to limitations placed on individual accounts will in many cases produce exactly the opposite outcomes of those intended: the Commission would be motivating carriers to reduce costs in individual accounts that may have little, if any, impact on overall carrier network efficiency. In short, the Commission's new system at once *discourages* efficiency in some respects and *invites* gamesmanship instead. The Commission's total outlays for universal service will therefore not be optimized, and broadband networks can be expected to suffer as a result.[126]

The Commission's decision to utilize quantile regression analyses to limit recovery of capital and operating costs was based in part on the work of Roger Koenker and Gilbert Basset, who explained how quantile regression models can overcome errors

[125] *Id.*, Exhibit 7B.

[126] *Id.* at 14.

commonly associated with ordinary least squares models.[127] The Associations contacted Dr. Koenker and asked him to review the Commission's proposed use of a quantile regression analysis methodology to assess capital and operational expenditures in individual accounts. As Dr. Koenker explains in his paper (Attached as Appendix E to these Comments), the Commission's method inappropriately estimates quantiles for each distinct cost component, thereby producing results that may be "unduly stringent in some cases and unduly lenient in others."[128] Such arbitrary variability undermines the very purpose of relying upon a quantile regression analysis in the first instance.

5. The Independent Variables Used in the Commission's Models Introduce Unacceptable Arbitrariness in the Results Achieved.

The Commission's regression analyses relate dependent variables (algorithm line costs per loop) to independent variables (loop counts and census data). Independent variables used in the models include housing units, land area, and census block counts, separately for non-urban, urban, and urban cluster areas; and loop counts and percent water by study area.[129] Of these, only one variable (loops) is statistically significant in all models. Other variables are significant in some but not all models. Nevertheless, the Commission has included all independent variables in all models. This is not a valid statistical method. Independent variables should be included in models only to the extent they produce statistically significant results.[130] Even in those cases where an independent variable produces statistically significant results, the Commission's models employ data

[127] *Order*, Appendix H ¶¶ 7-8.

[128] Appendix E at 1, Assessment of FCC Quantile Regression Methods for Estimation of Reimburseable Cost Limits, by Dr. Roger Koenker.

[129] Appendix D, Subsection E at 15.

[130] *Id.*

that is actually not known, such as urban/rural designations.[131] By Dr. Koenker's observations, all independent variables in the Commission's models, except counts of loops, contribute to incorrect models, and to wrong estimates based on the models.

6. The Adverse Impacts Caused by Flaws in the Commission's Models Are Serious and Would Severely Impact Support Payments to RLECs.

The above analyses makes clear that use of quantile regression analyses as proposed by the Commission would be substantially arbitrary. The support distortions caused by these flaws are significant.

Details of the effects for each cost company study area are shown in Appendix D, Attachment 1. Of 720 total study areas examined, 283 would receive lower payments because of cost per loop reductions. Thus, while each quantile model is designed to limit data associated with 10 percent of study areas, different study areas are affected by each model differently, resulting in 41 percent of study areas being limited by one or more models. This produces a much greater impact than can be expected based on a goal of eliminating the most extreme cost data.

Of the 283 study areas affected by limits, 91 would have their payments affected by 10 percent or more. Companies in the higher ranges of cost per loop impact would tend to have about the same proportionate impact on cost per loop and on HCLS payments. Companies in the lower ranges of cost per loop impact tend to have payment impacts significantly larger than their cost per loop impacts. Overall, the Commission's limits would reduce average cost per loop by 5.1 percent but would reduce support payments by 14.1 percent**.**

[131] *Id.* at 16.

This comparison shows that the arbitrariness of the Commission's adjustments to loop cost would be multiplied by the process that calculates support payments based on these costs. These results are plainly inconsistent with the Commission's intent to limit payments made only for imprudent investment or expenses. This result is unacceptable from a public policy perspective, and on its face violates the statutory principles governing universal service – there is simply no rational basis for the Commission to conclude that a USF mechanism specifically designed to reduce support payments by some arbitrary amount greater than cost is either sufficient or predictable.

B. The Commission Cannot Apply Quantile Regression Analyses to ICLS Without Giving Full Consideration to Impacts and Procedures for Accomplishing Such Adjustments.

The Commission's *Order* concludes that methods similar to the HCLS regression models should be used as well to limit costs eligible for ICLS. As explained in the *December 29 Petition for Reconsideration*, this decision was premature.[132] ICLS is paid initially based on projected data, and is later trued up to reflect actual accounts for the year of payments. Furthermore, the data lines needed to calculate ICLS are quite different than those needed to calculate HCLS. For example, while HCLS payments in 2013 will reflect 2011 accounts, ICLS payments in that year will reflect current accounting data. For these reasons, different models would be needed for ICLS than for HCLS. This would have the effect of establishing two different sets of limiting models during the same support payment periods – one for HCLS, the other for ICLS. The

[132] *December 29 Petition for Reconsideration* at 11-12.

Commission must also clarify which data lines would be subject to model limitations, and which model structures would apply to ICLS.[133]

Considering the extensive absence of methods, rationale, and impact assessment, it was premature for the Commission to conclude that statistical models to limit capital and operating expenses should apply to ICLS. And even if this decision was timely, given the substantial concerns with the regression analysis methodology as applied to HCLS as described above, there is no reasonable path for the Commission to extend that fundamentally flawed methodology to ICLS.

C. The Commission's Regression Analyses Should be Replaced With Limitation Proposals Found in the RLEC Plan.

For all the above reasons and those additional reasons explained in substantial detail in Appendix D, the Rural Associations recommend the Commission discontinue attempts to employ quantile regression models to limit recovery of capital and operating expenses via universal service support mechanisms. The Commission should instead implement the more reasonable approaches for limiting capital and operating expenses proposed by the Rural Associations as part of the RLEC Plan.

The Rural Associations proposed to limit capital expenses by analyzing the extent to which carriers' loop plant had reached the end of its useful life, as measured by booked depreciation amounts.[134] This approach addresses concerns regarding potential recovery of "race-to-the-top" investments in broadband loop plant. By basing the level of capital expenditure recovery from high-cost support on the degree to which loop plant has reached the end of its economic life, the RLEC Plan's constraint assures that limited high

[133] Appendix D at 19.

[134] *Rural Associations April 18 Comments* at 8-10.

cost funds available for incremental investment will go where they are most needed and will be distributed fairly.[135] Moreover, the RLEC Plan's approach would avoid the inaccuracies and unpredictability associated with statistical models, and would also avoid retroactive capping of investments made in prior years. Under the RLEC Plan proposal, RLEC management would know the allowable levels of expenditures in advance of making capital decisions.

For operating expenses, the RLEC Plan proposed applying the same limitation mechanism the Commission currently uses for recovery of corporate operations expenses via HCLS to other support mechanisms. This approach would also accomplish the Commission's goals in this proceeding, but in a far simpler and more predictable manner than use of regression models. [136]

[135] RLECs would continue to be able to recover the costs of existing investments, including committed investments such as the non-grant portions of stimulus fund projects arising from the American Recovery and Reinvestment Act (ARRA). The RLEC Plan also assures that funding levels remain manageable, stable, and predictable by spreading out future investment over time.

[136] If the Commission proceeds with adoption and implementation of the operating expense caps based upon regression analyses notwithstanding all of the concerns discussed herein, it should rule that those caps will not take effect until at least July 1, 2013 and possibly not until July 1, 2014. No firm can "turn on a dime" and comply with a new regulation, and the Chairman has been appropriately concerned about "flash cuts" in reform. Indeed, with respect to all caps adopted in the *Order and FNPRM* that limit recovery of operating expenses (*e.g.*, those based upon regression analyses, the $250 per line per month cap, and the extension of the corporate operations expense cap to ICLS), the Commission should find that they will not take effect until at least mid-2013, so that providers will have sufficient time to adjust operations accordingly.

V. THE COMMISSION SHOULD PROCEED WITH SUBSTANTIAL CAUTION IN DETERMING WHETHER AN AREA IS SERVED BY AN "UNSUBSIDIZED COMPETITOR" AND BEFORE TAKING STEPS THAT UNDERMINE THE AVAILABILITY AND AFFORDABILITY OF SERVICES IN ANY GIVEN STUDY AREA.

In its *Order*, the Commission concluded that it will phase out all high-cost support received by incumbent RoR carriers over three years in study areas where an unsubsidized competitor, or combination of unsubsidized competitors, offering voice and broadband service that meets its performance obligations serves 100 percent of the residential and business locations in the incumbent's study area.[137] In its *FNPRM*, the Commission seeks comment on the methodology and processes for determining overlap.[138] It also seeks comment on expanding the concept to areas with less than 100 percent competitive overlap.[139]

The decision to pursue this course of action without full consideration of its impacts threatens the very fabric of COLR obligations that have made it possible for rural carriers to provide high-quality service to expensive and difficult-to-serve rural consumers.[140] Such measures threaten to undermine service for customers across rural America (even in so-called "competitive" areas) for whom service has been made available in the first instance only because universal service funding enabled network investment and operation throughout that study area.

The *December 29 Petition for Reconsideration* accordingly requested the Commission reconsider this portion of its *Order* insofar as it would apply to areas with

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[137] *Order* ¶ 283.

[138] *FNPRM* ¶ 1061.

[139] *Id.* ¶ 1073.

[140] A comprehensive list of COLR obligations was provided by the Rural Associations in their *April 18 Comments* at Appendix C.

100 percent overlap.[141] In these comments, the Rural Associations discuss in detail the need: (a) for a granular, "data-driven" process to identify any purported "competitive overlap;" and (b) why consumer interests dictate the Commission should proceed with substantial caution in defining and implementing the consequences of any such finding. These comments also raise several other policy and consumer protection concerns that could arise out of proposals to "carve up" individual study areas.

A. The ***States***, Rather Than the Commission, Should Identify Competitive Areas Through a Carefully Considered Evidentiary Process.

Although recognizing "several potential limitations" in the means by which "competitive overlap" might be identified, the Commission suggests and seeks comment on an analysis that relies on two sets of 2010 data: the Tele Atlas Wire Center Boundaries and the State Broadband Initiative program administered by NTIA.[142] The limitations on this data, however, are not "potential." To the contrary, the limits are very real and readily apparent (although apparently inestimable), and the consequences of using either dataset could be significant.[143] Neither one, nor a combination of the two, has been shown to provide a direct or reliable measure of actual voice and broadband competition.[144] Indeed, given that the Commission's own staff noted the utter

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[141] *December 29 Petition for Reconsideration* at 18-19.

[142] *FNPRM* ¶ 1062.

[143] Concerns regarding the use of Tele Atlas data, in conjunction with census information, as the basis for the Commission's quantile regression models are described in Appendix D at 2-7.

[144] *See, e.g.,* Letter from David Cosson, Counsel to Accipiter Communications Inc. to Marlene H. Dortch, Secretary, FCC, CC Docket No. 96-45, App. A (filed March 11, 2011) discussing limitations of TeleAtlas data; *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely*

unreliability of the Tele Atlas data only a few months ago, it is unfathomable the Commission would now propose to use this resource as a means of parsing USF dollars:

> Tele Atlas boundaries may not be accurate in every instance . . .. In certain western states, for example, the Tele Atlas boundaries appear larger than those seen in other sources. This could increase the chance of finding a census block served only by funded small or regional competitive ETCs, creating upward bias in the results. However, because we cannot assess the inaccuracies in the Tele Atlas boundaries in a comprehensive way, it is impossible to determine the overall direction of their impact.[145]

Similarly, the National Broadband Map ("NBM"), even if its accuracy does in fact improve with each iteration, presents concerns of its own. Several studies have noted that reliance on self-reported provider data introduces a series of concerns, including the facts that: (a) providers "often paint their coverage areas with a broad brush" and (b) the NBM merges business and residential services such that "while some areas may appear to have a plethora of service options, the majority of providers are targeting businesses, not private residences."[146] Hearkening back to the importance of a COLR presence in rural areas, if a competitor is offering quality broadband and voice only to businesses in a given area, this is cold comfort for residents in that location – and the loss of USF support

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Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, GN Docket No. 10-159, Seventh Broadband Progress Report and Order on Reconsideration, 26 FCC Rcd. 8008, 8081 (2011), Appendix F (on the limitations of the NTIA data). *See also Rural Associations April 18 Comments* at note 112; *see also*, Gerald S. Ford, PhD, *Challenges in Using the National Broadband Map's Data*, Phoenix Center Policy Bulletin No. 27, Mar. 2011.

[145] Letter of Jennifer Prime, Legal Counsel, Wireline Competition Bureau, to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al*. (filed Oct. 19, 2011), at Appendix II, at 6 (citations omitted).

[146] Tony H. Grubesic, *The U.S. National Broadband Map: Data Limitations and Implications*, Geographic Information Systems and Spatial Analysis Laboratory, College of Information Science and Technology, Drexel Univ. (2011) (quoting Benjamin Lennett and Sascha Menirath, *Map to Nowhere*, Slate (May 2011)).

for the only carrier who offers residential service in that area due to the presence of a business-oriented competitor could lead to an unfortunate "false positive" of competitive choice for the majority of consumers in that area.

Given the potentially devastating impacts of phasing out support in an area that requires support, it would be arbitrary and capricious for the Commission to waste its time on a methodology that contains such patent imprecision and generally acknowledged unreliability. Rather than cobbling together a list of competitive areas from questionable data, the Commission should look to state commissions in the first instance for review of claims regarding the presence of "unsubsidized competition" in a rural study area. Though the Commission seeks no comment on the issue, the elimination of USF support (including any potential impacts on a Recovery Mechanism) directly impacts state regulation of intrastate telecommunications providers. States exercise their authority to impose COLR obligations, the authority to approve ETC relinquishments and the authority to impose certain rural safeguards within rural telephone company areas. A federal determination of unsubsidized competition and subsequent phase-down of support leaves little room for state oversight of its providers and could effectively preempt state regulation. Instead of traveling down this legally questionable path based on faulty data, the Commission should take a more careful course that preserves the states' role and ensures the determination is left to regulators who are much more familiar with "facts on the ground." [147]

[147] For example, the Commission recognizes there is no way to directly measure of the availability of voice service in a given area, but its analysis nevertheless "presumes" that an unsubsidized xDSL, fiber, or cable competitor "that has deployed a broadband network that meets the SBI standard also is offering voice services." *FNPRM* ¶ 1067. There appear to be at least some instances where this is not the case, however. This again

State commissions are by nature and proximity better equipped than the federal government to make local competition determinations. States have in place, or have the ability to develop, their own reliable coverage maps and tools for determining competitive levels. State commissions and state consumer advocates are familiar with the providers and consumer complaints, and can investigate the facts surrounding disputed claims of coverage.

State commissions also have access to more recent data – a key factor in determining how broadband may have evolved (or retrenched) in a given market as providers alter their service offerings. By contrast, the data depicted on the NBM are, as of the date of this filing, more than twelve months old.[148] Because of the processes involved in updating that information, the data on the NBM will always lag, and might never accurately reflect "facts on the ground" at the time an evaluation is being made. Moreover, state commissions can rely upon additional resources – including their own field examinations of current conditions in the market and even data requests at a time the evaluation is being made – to determine with much greater precision what the current state of broadband is in a given market.

State commissions offer a much more reliable and credible vehicle for establishing the precise contours of competitive presence in local markets. State consumer advocates can also play an important role in ensuring the best interests of all affected customers are considered fully. Just as the Telecommunications Act of 1996

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supports the need for fact-based evidentiary proceedings to determine actual the degree of competitive overlap.

[148] The top of the webpage rendering the National Broadband Map indicates that the data presented are current as of December 31, 2010, available at: http://www.broadbandmap.gov/technology.

envisioned joint responsibility between the states and the Commission in fostering competition in local markets, the most sensible division of labor here would be to have the Commission establish the "methodology" and process by which competition would be identified, but leave to the states an examination of the specific facts regarding the existence of such competition.

B. There Should be a Clearly-Defined Trigger and Process for Determining Competitive Areas.

Because the national maps and databases provide no reliable source of identifying a purportedly "competitive" area, the process for identifying such overlap should commence instead upon the request of a competitor who believes it is competing against a subsidy. Indeed, this is how the National Cable & Telecommunications Association ("NCTA") itself first posited this process should be initiated – the competitor should come forward to demonstrate that a specific area is "competitive" and that the level of USF support available for that area should therefore be reassessed.[149]

If the Commission presses forward with a "competitive area" review, it should therefore design and implement a process similar to that first suggested by NCTA – that is, requiring the process to be initiated upon the request of a competitor, rather than by generic automatic reference to imprecise and dated mapping data. Moreover, the Commission should define precisely what kind of showing will be needed to establish the presence of "unsubsidized" competition and provide an opportunity for a USF recipient to rebut that evidence. For reasons discussed in the previous section, disposition of the

[149] *See* Petition for Rulemaking by National Cable & Telecommunications Association, RM-11584 (filed Nov. 5, 2009) at 12.

debate should be turned over to the state commission to examine the facts and reach a conclusion with respect to the presence of competition.

To trigger this process, a competitor should be required to aver and show through clear and convincing evidence in a petition to a state commission (with a copy to the applicable consumer advocate's office) that, at a minimum:

(a) it is a state-certified carrier or ETC (to ensure adequate opportunity for regulatory and consumer advocate oversight);

(b) it can satisfy any public interest obligations required of the ILEC (to ensure continuing service quality):

(c) it can deliver, as of the date of the filing of the petition, voice service and broadband speeds of at least 4 Mbps downstream/1 Mbps upstream and with latency and usage limits that meet the Commission's broadband performance requirements for 100 percent of *both* the residential ***and*** business locations in the purportedly competitive area through the use of its own facilities in whole or in substantial part and in a manner comparable (fixed or mobile) to the relevant USF/CAF recipient. A fixed service can be either fixed wired or fixed terrestrial wireless. A fixed terrestrial wireless service should be defined as one that does not support roaming and requires a fixed ground station transmitting to a fixed transceiver located at the customer's premises;

(d) it offers each of those broadband and voice services on a stand-alone basis at rates that are reasonably comparable, as defined by the Commission, to those offered by the ILEC (to ensure affordability of rates for consumers);

(e) it will comply with the same reporting, service monitoring, and other "accountability" requirements as a USF/CAF recipient for the area in questions (to ensure continuing service quality ***and*** to ensure that the state and the Commission are aware to the extent that the competitor at some subsequent point no longer serves the entire market in the manner presented in the initial petition); and

(f) it neither receives high-cost support of any kind ***nor*** cross-subsidizes its operations in the specific, affected study area with revenues from other areas of operation or sources. Any competitor seeking to establish that it provides unsubsidized competition must be required to present evidence – in the form of *pro forma* financial statements for its operations in that area – demonstrating that the area is indeed "economic" of its own accord and can support a *stand-alone* business plan (*i.e,* that service in the area is not

being cross subsidized by revenues/profits from the competitive provider's other service areas or lines of business).[150]

The USF recipient whose support would be reduced upon a determination of unsubsidized competitive overlap should then be given the opportunity to rebut the competitor's showing. To be meaningful, this opportunity must include the ability to access and review data filed by a competitor. That is, to make the process fair and to ensure that necessary support is not eliminated by virtue of a "false positive," the competitor's assertions should be subject to full scrutiny and testing. The state should have full and complete information and the benefit of a truly robust debate as it considers a consequence as potentially dire as the complete elimination or substantial reduction of support and potential bankruptcies of RLECs serving rural customers as COLRs.

C. Final Determinations Regarding Support Levels in Competitive Areas Should Rest with the State, and Must Include a Federal Waiver Process.

Upon a competitor's showing by virtue of clear and convincing evidence that it offers truly unsubsidized competitive service to the consumers throughout the relevant area, the final determination regarding the precise amount of support reductions should rest with the state. There are a variety of situations and circumstances in which a 100 percent reduction in support may not be in the public interest, despite the reduced cost to the federal USF. A blanket rule that support is reduced based solely on competition does

[150] Absent such a showing, the Commission runs the risk of failing to identify accurately those areas that are in fact "uneconomic" to serve, thereby reducing or eliminating support where it is needed based upon the actual characteristics of those areas such as density, addressable market, etc. This is a key point that appears to have been lost over and over again in the discussion of "subsidy" to date – focusing *only* upon USF support and not upon *both* USF support *and* cross-subsidies from other service areas distorts the incentives and capability to serve any given market, and could lead to an area that is in fact dependent upon subsidy being deemed entirely self-sustaining when it is anything but.

not take into consideration, for example, the fact that a cooperative may lack the discretion to deny service to any customer or potential customer within its service territory, that an RLEC's RUS or other loan covenants may require line extensions for which USF is still needed, or that a competitor is not financially sound. There exist many circumstances, a list of which cannot be compiled until the circumstances present themselves, for which complete elimination of support may be harmful, unlawful, or otherwise not in the public interest.

Indeed, state commissions are well-versed in making such determinations as a result of having reviewed requests for ETC designation for years. The same "public interest" issues that drove such determinations of whether to designate an ETC – including questions such as the impact on reasonable and comparable rates, concerns about potential "creamskimming," and the quality of services being offered – are issues that the states are once again best positioned to evaluate in the context of whether an area should effectively migrate to the "non-designation" of ***any*** ETCs for a given area.

Finally, as a backstop against irreparable harm, the Commission must create a reasonable and economical federal waiver process by which the USF or CAF recipient can seek to have its support maintained, slow down the schedule at which it is reduced, or reinstated. There is a high probability that RLECs will fail absent relief from a blanket rule, leaving rural consumers without a provider. RLECs should be able to make a showing that a waiver is appropriate and in the public interest.

D. Any Reduction or Elimination of Support Should be Prospective Only.

The Commission adopted a rule to phase out all high-cost support received by RLECs in competitive areas over three years, but did not address or seek comment on

how the support reductions apply. The Commission must ensure reductions of support do not affect the ability of RLECs to recover existing investments made under current rules. Any cut-off or reduction of funding used to recover the cost of existing investment violates the core statutory principles that require that USF funding be predictable and sufficient. RLECs have efficiently invested in their networks under the current rules and pursuant to their COLR obligations to make quality voice service ubiquitously available throughout their territories *and* to offer broadband services to as many of their customers as possible. A COLR that invested in what is subsequently considered a competitive area – perhaps well before the competitor ever arrived – and that is dependent on support to recover such good faith investments must not be punished for rules and limitations developed only after the fact. The Commission should rule that any reductions or eliminations of support apply only to investments and associated operating expenses made or incurred on a prospective basis.[151]

E. There Should be no Reduction of Support in Areas Where There is Less Than 100 Percent Overlap by a Competitor.

The Commission questions whether support levels would "need" to be adjusted in areas where there is less than 100 percent overlap by an unsubsidized facilities-based provider of terrestrial fixed voice and broadband service. The answer for areas served by RLECs is an emphatic and unequivocal "No."

[151] Such a rule would put the RLEC on notice that any further investment in such areas is at its own risk. Presumably, if a business case can be made for providing service to the area without support, as this whole process suggests, an RLEC would be inclined to continue to invest and operate in such an area. But such continued investment would be made in full awareness of prospective limitations on support.

First and foremost, the risks of loss of service to the most vulnerable rural customers are too great. RLECs construct and operate integrated networks to serve rural communities (the "donut holes") and the more sparsely populated areas surrounding them (the "donuts"). Whereas both the core communities and the surrounding hinterlands are relatively sparsely populated and expensive to serve, the core communities are generally the relatively more "densely" populated and "profitable" of the two. Should a competitor engage in creamskimming by serving the core community, it not only will threaten future investment and service quality in the core community by splitting a market that was previously too small to justify multiple carriers, but also will reduce the RLEC's ability and incentives to serve the less "profitable" donut area. If the Commission proceeds to eliminate the RLEC's high-cost support for the core community, it will disrupt, if not destroy, the RLEC's network-based business plan, and encourage it to cut back on investment and service to the most expensive and difficult-to-serve consumers in the donut area.

There are very clear and substantial differences between price-cap companies and RLECs. Per-line RLEC costs are higher, economies of scope and scale are smaller, and they are far more reliant on universal service funding. Changing one piece of the funding puzzle can have far more devastating impacts on a company serving a single supported study area than on a company serving multiple study areas, some of which require little or no support. If an RLEC fails and cannot serve the study area "donut," no other provider will remain to pick up the pieces, and basic service to rural consumers will be at risk.

Further, the Commission cannot, with any confidence, predict the consequences of its initial decision to eliminate support in areas with 100 percent overlap. Indeed, the Commission has not even yet defined the process by which it would do so for 100 percent overlap, or the consequences of doing so. Extending that approach to other areas while such fundamental questions are still being examined would be an extreme example of putting the cart before the horse. As a matter of good policy, the Commission should evaluate the consequences and consumer impacts of eliminating support in areas with 100 percent overlap before expanding the policy to other study areas with lesser coverage overlaps.

F. If the Commission Nevertheless Attempts to Pursue Support Reductions in Partially Competitive Areas, Reasonable Methods Must be Found to Permit Disaggregation of Study Areas.

If, despite the above concerns, the Commission elects to implement methods to reduce support in areas partially served by unsubsidized competitors, it should proceed in partnership with the state commissions to disaggregate the relevant RLEC's study area and allocate costs in some manner between the "hole" in which the competitor exists and the "donut" that continues to be served solely by the RLEC without a competitive presence. But, the Commission should be aware that, given the substantial likelihood the competitor will operate in the most densely populated (*i.e.*, lowest-cost) portion of any given study area, disaggregation and reallocation of costs may result in an *increase* in support for the RLEC, as the benefits of averaging associated with the lower-cost "hole" are eliminated and the higher costs of serving the "donut" are taken fully into account on a stand-alone basis.

At a time when the Commission seeks to constrain growth in the USF and find greater efficiencies in the use of high-cost support dollars, any process that proposes to target support to non-competitive portions of study areas is likely to produce precisely the opposite effects – the pressures on the Fund will increase and the efficiencies that come today from averaging the costs over an entire study area will be all but eliminated. Indeed, this same concern about the prospect of carriers eliminating averaging and subdividing their own study areas to maximize USF support is what initially drove the Federal-State Joint Board on Universal Service and the Commission to propose and adopt a study area boundary freeze, and to condition waivers of that freeze upon a showing that the specific boundary modification would not place pressure on the USF.[152]

Further complicating the situation is the possibility that disaggregation would result in a carrier's per-line cost recovery exceeding the $250 per line per month cap adopted in the *Order*. It is probable that some carriers currently below the cap based upon total study area-averaged costs would exceed it following the disaggregation of costs. If the Commission proceeds down this path and takes away the benefit of averaging that helps maintain efficiency in the USF program, it should make sure not to penalize carriers whose per-line support amounts increase precisely because of the Commission's policy determination.[153]

The Commission also questions whether it would be appropriate to use a model to create a presumptive reduction in support levels for RLECs upon a finding of

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[152] *See, e.g., MTS and WATS Market Structure,* CC Docket No. 78-72, and *Amendment of Part 67 of the Commission's Rules and Establishment of a Joint Board*, CC Docket No. 80-286, Recommended Decision and Order, 48 Fed. Reg. 48325, 48337 (1984).

[153] Since amounts associated with the RM are not tied to specific areas or portions of areas, the Commission should also confirm that such support would not be reduced based on findings of competitive overlap.

"unsubsidized competition" in a study area.[154] Specifically, it asks whether it should consider the process outlined by NCTA in comments filed late last year, whereby a model would be used to determine how support should apply. The so-called "model," however, is not developed or even fully described in the *FNPRM*. The Rural Associations have explained time and again the difficulty of using costing models in rural areas.[155] Given the stakes involved and the very real danger of RLECs being unable to financially maintain service to the "donut" areas if support is reduced for partial competition, the Commission should refrain from further consideration of such approaches.

G. Questions With Respect to Redefining and Potentially Relaxing ETC Obligations and Redrawing Study Areas Highlight the Practical Inconsistencies and Legal Concerns of Departing From COLR Standards.

The Commission asks whether it should adopt a rule relieving RoR carriers from the obligation "to serve any location within their study area that is served by an unsubsidized competitor and will not receive support for those lines to the extent they choose to extend service to areas of competitive overlap."[156] This line of inquiry goes far beyond the already complex issues of study area cost allocation and disaggregaton, as any such rule modifying ETC obligations and redefinition of service areas will raise a host of

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[154] *FNPRM* ¶ 1076.

[155] *See, e.g.,* Reply Comments of NECA, NTCA, OPASTCO, and WTA, WC Docket No. 10-90, *et al.* (filed Sept. 6, 2011) at 6, citing *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Fourteenth Report and Order and Twenty-Second Order on Reconsideration, *Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers*, CC Docket No. 00-256, Report and Order, 16 FCC Rcd. 11244 (2001) ¶ 25.

[156] *FNPRM* ¶ 1038.

legal issues as well. Indeed, this question drives to the heart of the broader policy and jurisdictional concerns with respect to slicing up study areas for "donut" and "donut hole" purposes, and it highlights that this is a path the Commission cannot go down alone without violating the Act or impermissibly preempting state prerogatives.

As the Commission is well aware, section 214(e)(2) of the Act confers upon state commissions the primary authority to designate ETCs and to designate their service areas. Section 214(e)(5) defines the "service area" of an RLEC as its study area unless and until both the Commission and the state, after taking into account recommendations of a section 410(c) Federal-State Joint Board, establish a different definition of "service area" for such RLEC.[157]

These statutory allocations of jurisdiction preclude the Commission from acting on its own to change ETC service requirements and/or the service areas of ETCs that have been designated pursuant to section 214(e)(2) by state commissions. "[N]either the Commission nor the states may act alone to alter the definition of service areas served by rural carriers," and proposed redefinitions do "not take effect until the Commission and the appropriate state commission agree upon a new definition."[158] Thus, an RLEC's service area for USF purposes can be modified or reduced vis-à-vis its study area only if: (1) the Commission or the appropriate state commission proposes to "redefine" the RLEC's service area pursuant to section 214(e)(5) of the Act (subject to considerations

[157] Section 214(e)(6) gives the Commission the authority to designate common carriers that are not subject to state commission jurisdiction as ETCs, and to designate their service areas in a manner consistent with applicable federal and state law. Finally, section 214(e)(3) grants the Commission with respect to interstate services, and state commissions with respect to intrastate services, the authority to designate an ETC for an unserved community or portion thereof.

[158] *FNPRM* ¶¶ 1092-93.

such as creamskimming, the Act's special treatment of rural telephone companies, and the administrative burdens of redefinition) and the other agency agrees to a new definition[159]; (2) the appropriate state commission orders the disaggregation and targeting of an RLEC's USF support pursuant to section 54.315 of the Commission's Rules; or (3) if the RLEC requests its state commission pursuant to section 214(e)(4) of the Act to permit the RLEC to relinquish its ETC designation in all or a portion of its service area if such relinquished area is served by one or more other ETCs.

The common feature of all three approaches is active state commission involvement. Consequently, at least for RLECs, the discussion as to whether high-cost support and related ETC service obligations should be governed by wire centers, census blocks, census tracts or counties rather than existing study areas is premature and speculative until and unless the appropriate state commission has considered and approved a new geographic area for each RLEC. This is not only legally correct, but reasonable and proper as well, since state commissions are much closer to and more familiar with the specific circumstances and service needs of particular service areas within their own boundaries.

Even if the statute provides a means to reduce ETC service obligations or carve up service areas without pre-empting or otherwise interfering with the jurisdiction of the states -- which it does not – there is still the matter of state COLR obligations, which the Commission has stated it does not seek to modify.[160] It is not clear whether certain states would be willing or able to modify or eliminate COLR requirements that conflict with

[159] To date, such section 214(e)(5) "redefinitions" have affected only the USF support of competitive ETCs, and have had no direct impact upon the USF support of the underlying RLECs themselves.

[160] *Order* ¶ 15.

Commission actions, and (if not) whether the Commission would be able to pre-empt such state COLR requirements. Yet the carving-up of study areas for "donut" and "donut hole" purposes, particularly without the coordination and oversight of the state commission, would do just this. Generally, COLR requirements mandate the extension of ILEC networks and services to all, or virtually all, of the households within their state-certificated service areas. Unlike other service providers, COLRs cannot "cherry pick" only the more profitable customers and/or neighborhoods, but must extend service to all or most potential customers within their designated service areas. COLR requirements have proven very successful in extending universal service to unprofitable or otherwise unattractive areas as well as improving the public health, safety and welfare of the residents of such areas. At the same time, COLR requirements impose burdens, including substantial unrecovered capital expenditures and outstanding construction loan balances, continuing above-average operating expenses, exacting service and service quality obligations, and significant regulatory and reporting burdens. Reducing RLEC USF and ICC revenue streams while such RLECs remain subject to substantial COLR burdens and costs is a recipe for financial distress and ultimate degradation of service quality and availability.

H. The Commission Should Proceed With Caution In Implementing A "Remote Areas Fund" To Avoid Relegating "Remote" Consumers To Substandard Service Or Disrupting Services for Other Rural Consumers in the Same Study Areas.

The Commission explains that it ultimately intends to use the "forward-looking cost model" used to determine distribution of support under the CAF for price cap carriers to identify "extremely high-cost" remote areas. These areas, in territories served

by both RoR and price cap-regulated carriers, would then receive support only under the new Remote Areas Fund ("RAF"). In advance of model development, however, the *FNPRM* proposes to provide RAF support in unserved census blocks in price cap areas, using the NBM to identify such areas.[161]

As an initial matter, reliance upon the NBM – particularly in matters relating to the distribution or elimination of essential USF support resources – is highly questionable for reasons discussed earlier in these comments. The NBM continues to be plagued by doubts as to its accuracy and validity, with industry sources and other commentators noting the many respects in which the NBM both under-reports and over-reports the presence of providers in various serving areas. Even data improvements in subsequent iterations of the NBM do not appear to have resolved substantial concerns with respect to the accuracy of the data overall. The Rural Associations therefore continue to caution the Commission against any use of the NBM in making conclusive determinations with respect to where support should be directed or where support should be revoked. Instead, as discussed elsewhere herein, the Commission should defer to the state commissions and other state authorities for a more granular determination of local conditions, including where unserved locations, competitively served broadband, and remote areas might exist.

Moreover, even if the NBM data were accurate in certain areas, there is the substantial risk that areas that appear unserved pursuant to the NBM will be built out in near future pursuant to Phase I CAF state-level commitments made by price cap carriers, merger commitments that remain in effect, stimulus-funded projects that are likewise in progress, and/or other private sector efforts or public-private partnership initiatives to

[161] *FNPRM* ¶¶ 1229-30.

deploy broadband.[162] Because it relies upon data collected months in advance of publication (and the attentiveness of data contributors), the NBM will necessarily omit data reflecting relatively recent deployments. If the Commission is concerned about targeting RAF support toward unserved areas to start, it therefore should not rely upon the current iteration of the NBM – which was published in September and reflects data that is now over one year old.

Indeed, complications such as these weigh against the Commission employing the RAF as anything more than a pilot program at this point. This conclusion is only buttressed by the fact that, even as it has adopted a RAF, the Commission has not yet identified its contours or how to implement it. For example, the *FNPRM* highlights many critical questions that remain unanswered, including: (1) should RAF support be distributed as a one-time award or on an ongoing basis?; (2) what are the performance criteria for RAF support, and quite frankly, can satellite realistically satisfy them?; (3) can satellite providers offer service at reasonably comparable rates to urban areas for both voice and broadband?; and (4) what subscribers should be eligible support? With all but the name of the Remote Areas Fund and the amount of funding available open for debate, this is no time to race ahead – especially when identifying the very areas that are remote remains a threshold question.

The Commission should, at most, seek to implement the RAF as a pilot project, working with a few states to identify areas that are in fact extremely high-cost. Here again, the states have the best proximity to "facts on the ground" and can provide better insight into where a RAF and alternative technologies might offer the best means of

[162] *See, e.g., Order* ¶¶ 144-147, note 233.

reaching consumers who will otherwise sit unserved for the foreseeable future. Moreover, a cautious approach and a well-designed partnership with the states is warranted as the Commission reshapes other aspects of the USF. In particular, misapplication of the RAF could have the undesirable consequence of undermining consumer needs and the ability of COLRs to maintain services throughout a study area – especially if certain portions of a service area are "carved off" for purposes of applying a RAF, but leave high-cost customers without a reasonable alternative for reasonably comparable services as required by section 254. For example, there should perhaps be some interrelationship between the $250/line/month cap adopted in the *Order* and the definition of a remote area in RLEC areas, rather than relying upon a model in subsequent years to carve up RLEC study areas yet further.

The Rural Associations understand the Commission has made the policy choice that some customers in some areas may simply be so remote that the costs of reaching them are excessive, but the Commission should be cautious in ensuring that its policies with respect to which customers are covered by which funding vehicle are consistent and coordinated – and that in the end, no customer is left without reasonably comparable service as called for by law. These considerations dictate a cautious and carefully crafted approach to implementation of a RAF.

VI. CONCLUSION.

Rather than continuing to focus exclusively on "cutting" and "limiting" RLEC support, the Commission should turn its attention back to the statutory underpinnings of universal service and the needs of consumers in RLEC areas – those who face the real prospect of being left behind without a meaningful, sufficient, and predictable CAF

mechanism. The Commission should adopt the RLEC Plan, or at a minimum discrete components of that plan, to carry out the statutory mandate for true "universal service" while adhering to reasonable and realistic budget targets.

The Commission should refrain from imposing additional measurement and reporting mandates on RLECs until such time as it has completed the construction and implementation of such a CAF. There has been no showing that RLECs have not been using USF funds in a reasonable and appropriate manner, and any new reporting obligations or other compliance mandates should be commensurate with the support provided and the risk presented. The Commission should likewise refrain from attempting to represcribe the authorized RoR until adequate methods governing such proceedings are put in place. The Rural Associations also recommend that the Commission refrain from employing quantile regression methods to limit reimbursements of capital and operating expenses, as the evidence demonstrates conclusively that such caps would be arbitrary, capricious, and contrary to the statutory requirement that USF support be specific, predictable, and sufficient. Finally, proposals to carve up study areas and to eliminate or limit support in areas with unsubsidized competition should be undertaken with extreme caution to avoid disruption to consumers – to minimize such

concerns, the Commission should rely on the expertise of state regulators, and incorporate procedures designed to assure customers continue to receive adequate service from a COLR.

January 18, 2012

Respectfully submitted,

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Appendix A

FCC Universal Service Presentation, December 2011

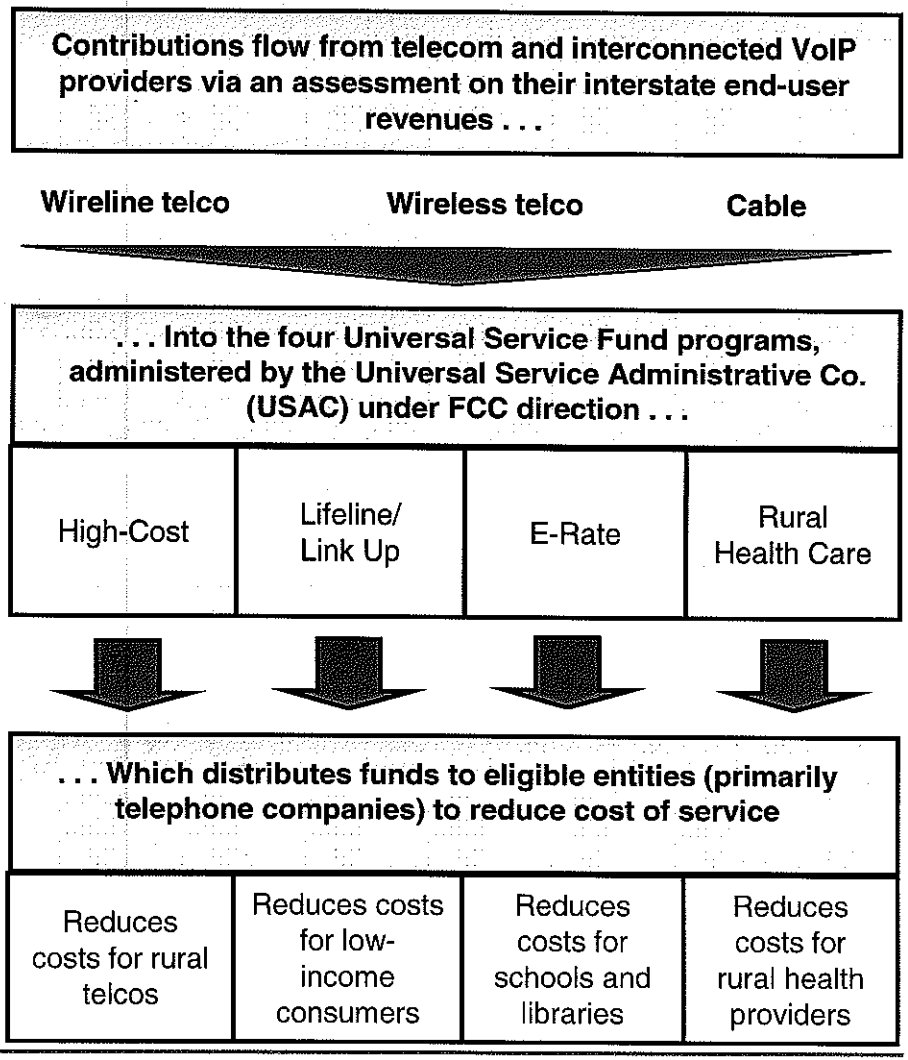
Universal Service

Wireline Competition Bureau
Federal Communications Commission

December 2011

What Is Universal Service?

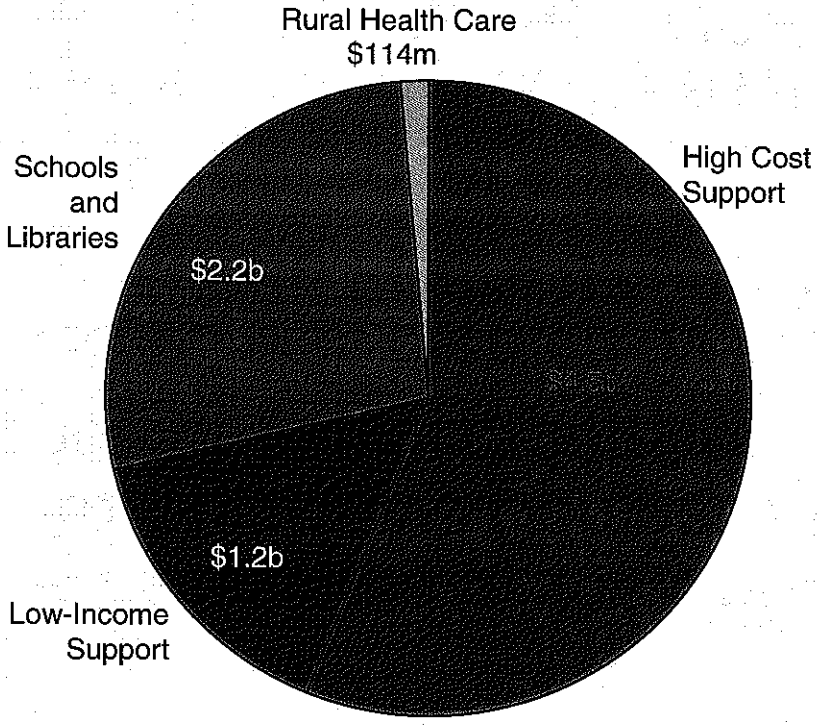
- Historic commitment to universal service
- Expanded in Telecommunications Act of 1996; Congress established Federal-State Joint Board on Universal Service
- Statutory Goals:
  - Promote **availability of quality services** at just, reasonable & affordable rates **for all consumers**
  - Provide **nationwide** access to advanced telecom and information services
  - Make available such services to all consumers, including **low income** and those in **rural, insular, & high-cost areas** at rates reasonably comparable to those charged in urban areas
  - Increase access to advanced telecom services in **schools, libraries & rural health care facilities**
  - Require equitable and non-discriminatory **contributions from all telecom providers** to the fund supporting universal service programs



What Does Federal Universal Service Support?

Relative size of federal USF programs, FY 2010
Total Outlays

(100% = $8.0 billion)



- **High Cost** focuses on service to all consumers (both residential and business) in high cost, rural and insular areas
- **Low Income (Lifeline/Link Up)** makes basic, local telephone service affordable for low-income consumers
- **Schools and Libraries (E-rate)** enables schools and libraries to connect to the Internet
- **Rural Health Care** provides reduced rates to rural health care providers

Source: USAC data

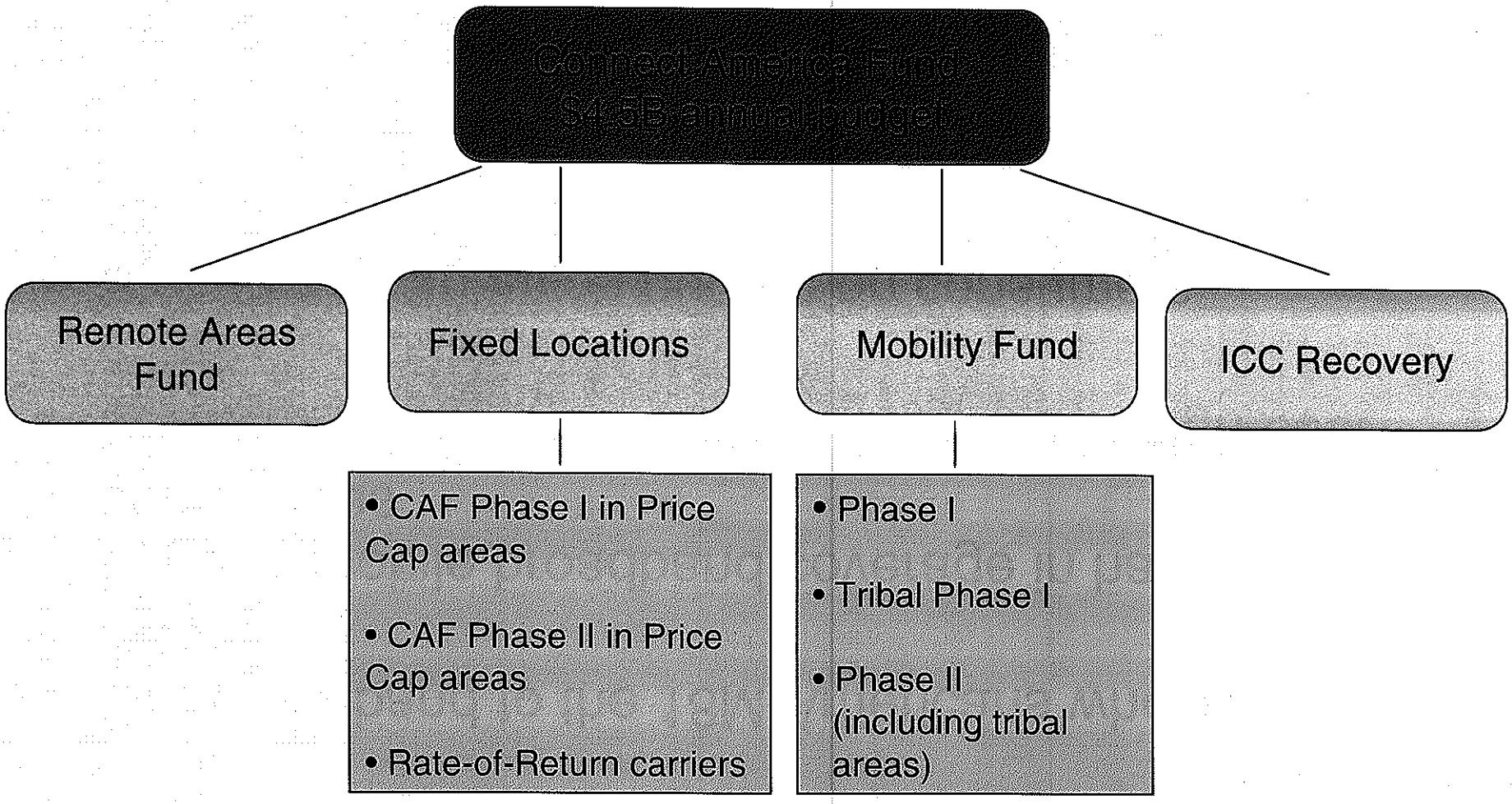
How is Universal Service Administered?

- Administered by the Universal Service Administrative Company (USAC), an independent, not-for-profit corporation
- USAC was created by the FCC to administer USF under the FCC's direction
- Does not set or advocate policy
- Collects and distributes funding for the USF and administers the four USF programs in accordance with the FCC's rules

Transition to the Connect America Fund: Objectives

- Get broadband to the 18M Americans who lack it today
- Expand mobile broadband coverage in hard to serve areas
- Maintain voice and broadband service in high-cost areas
- Stabilize contribution burden on consumers

Transition to the Connect America Fund: Framework



FCC adopts support for broadband-capable networks as an express universal service principle (*as recommended by the Federal-State Universal Service Joint Board*)

The Connect America Fund – Participants

- Any provider that is designated by the state commission or FCC as an "eligible telecommunications carrier"
- Historically:
  - Incumbent Local Exchange Carriers (ILECs)
    - Rate-of-return carriers
    - Price cap carriers
  - Competitive Eligible Telecommunications Carriers (CETCs)
    - Typically wireless carriers

The Connect America Fund – Price Cap Areas

Phase I:

- All existing legacy high-cost support to price cap carriers will be frozen, and an additional $300 million in CAF funding will be made available in 2012
- Carriers electing to receive additional support will be required to deploy broadband to unserved locations – serve a location for a set amount of incremental support.

Phase II:

- No support for (1) areas with unsubsidized competitor, (2) low-cost areas, (3) extremely high-cost areas (which are supported by Remote Areas Fund)
- Incumbent price cap carriers may receive support if they commit to serve supported locations within their service territories within a state for a specific level of support, based on a new forward looking economic cost model
- If willing to serve at model-determined amount, support provided for a five-year term, with obligations, reporting requirements, buildout milestones
- If unwilling to undertake broadband commitment in a given state, support for those locations within the state will be put up for competitive bidding

The Connect America Fund – Rate-of-Return Carriers

Support continued broadband investment, while increasing accountability and incentives for efficient use of public resources

- Limits on reimbursements for capital and operating expenses (seeking comment on proposed formula in the Further Notice)
- Corporate operations expense limits for high-cost loop support (HCLS) updated and extended to interstate common line support (ICLS)
- HCLS reduced for carriers that maintain artificially low end-user voice rates, with a three-step phase-in
- Safety Net Additive (SNA) phased out
- Local switching support (LSS) eliminated as a separate mechanism; addressed through CAF intercarrier compensation (ICC) recovery
- Phase out support in study areas that overlap completely with an unsubsidized facilities-based terrestrial competitor
- Cap per-line support at $250 per month, with a gradual phase down to that cap over a three-year period
- Further Notice on establishing a long-term broadband-focused CAF mechanism for rate-of-return carriers and on reducing the interstate rate-of-return from its current level of 11.25 percent

The Connect America Fund – Mobility

- Explicitly recognizes differences/value of mobile and fixed services, with funds dedicated both to mobile broadband and to robust residential/business broadband

- Establishes a Mobility Fund
  - Using reverse auctions to award support for the first time
  - Phase I: one time support to upgrade areas with no 3G ($300m), and additional $50 million Tribal Mobility Fund Phase I
  - Phase II: ongoing annual support to areas that would not have service without USF ($500m/year), including up to $100 million for Tribal areas
  - Seeking comment on details of Phase II in Further Notice

- Eliminates identical support rule
  - CETC support levels frozen per study area as of year end 2011, and phased down over five-year period beginning on July 1, 2012
  - CETC phase down will stop if Mobility Fund Phase II is not implemented by June 30, 2014

The Connect America Fund – Remote Areas Fund

- Allocates at least $100 million for the most expensive, hard to reach areas
  - Further Notice seeks comment on the details of how to award the support; may be through the use of portable consumer subsidies (analogous to Lifeline)

The Connect America Fund – Oversight

- Establishes performance goals for the CAF
- Adopts public interest obligations for all CAF recipients (scalable speed, latency, usage)
- Creates specific and enforceable reporting requirements and certifications concerning those public interest obligations
- Includes penalties for failure to meet public interest obligations or reporting requirements

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Questions?

Appendix B

Professor Barbara Cherry & Professor Steven Wildman, Paper: The Rate of Return for RLECs Must be in the Upper Range for Reform Under the Connect America Fund Order to Ensure Sustainable Policy Goals

The Rate of Return for RLECs Must be in the Upper Range for Reform Under the *Connect America Fund Order* to Ensure Sustainable Policy Goals

By

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I. INTRODUCTION

The FCC intends to address multiple policy goals in the universal service and intercarrier compensation reform set forth in the *CAF Order*.[1] These policy goals include: (1) enhancing the sustainability while ensuring continued availability and affordability of universal service in rural and remote areas based on explicit funding support to eligible telecommunications carriers (ETCs);[2] (2) expanding universal service policy to more prudently and efficiently target investment in broadband in rural and remote areas;[3] and (3) modernizing the policy by addressing outdated assumptions that give rise to inefficiencies, wasteful arbitrage, and competitive distortions.[4] Within a multifaceted framework of reform created in the *CAF Order*, the FCC "agree[s] that it is appropriate at this time to

[1] *Connect America Fund,* WC Docket No. 10-90, *A National Broadband Plan for Our Future,* GN Docket No. 09-51, *Establishing Just and Reasonable Rates for Local Exchange Carriers,* WC Docket No. 07-135, *High-Cost Universal Service Support,* WC Docket No. 05-337, *Developing an Unified Intercarrier Compensation Regime,* CC Docket No. 01-92, *Federal-State Joint Board on Universal Service,* CC Docket No. 96-45, *Lifeline and Link-Up*, WC Docket No. 03-109, *Universal Service – Mobility Fund,* WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, FCC 11-161 (rel. Nov. 18, 2011) (*CAF Order* or *FNPRM*).

[2] *Id*. ¶ 285

[3] *Id*. ¶ 7

[4] *Id*. ¶¶ 6,9

re-examine the rate of return as part of comprehensive reform of the universal service fund."[5] The FCC seeks comment regarding represcription of the interstate rate of return in the FNPRM.

Aside from the desire to reform universal service policy, FCC determination of rates of return for regulated companies is itself a policy decision[6] that must meet long-established legal standards. The fundamental legal standard is that "a regulated company must be allowed a return that is sufficient to attract new capital to the business, and that is comparable to the return that would be expected for an unregulated enterprise having the same degree of risk."[7] In this regard, the FCC determines both a floor and ceiling to the rate of return: "The return must not be so low as to produce rates that are confiscatory in the constitutional sense nor so high as to produce excessive rates for consumers."[8] The FCC's task "thus involves balancing investor and consumer interests and then selecting an appropriate rate of return that is within a broad 'zone of reasonableness' established by the judicial standards."[9] Therefore, this longstanding legal standard requires that the FCC determine a zone of reasonableness for a rate of return, and within that zone select a rate of return, that allows the firm to be financially viable.

As explained in this paper, the Commission's goals for universal service and intercarrier compensation reform in the *CAF Order* can only be sustained in rural and remote areas if RLECs remain financially viable. This means the FCC must make sure that the combination of the many

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[5] *Id*. ¶ 1044.

[6] "[R]ate of return decisions are policy determinations in which agencies must exercise their judgment and expertise." *Refinement of Procedures and Methodologies for Represcribing Interstate Rates of Return for AT&T Communications and Local Exchange Carriers; and Represcribing the Authorized Rate of Return for Interstate Services of Local Exchange Carriers,* Order, 5 FCC Rcd. 197 (1989) ¶ 38 (footnote omitted).

[7] *Id*. ¶ 37 (footnote omitted).

[8] *Id*.

[9] *Id*.

components of universal service and intercarrier compensation reform – only one of which is the prescription of the rate of return – as well as their coexistence with other aspects of federal and state regulation do not preclude financial viability for RLECs. For this reason, the sustainability of universal service goals in rural and remote areas and the financial viability of RLECs are inextricably intertwined, and the economic and legal constraints for satisfying both must be simultaneously addressed.

II. DETERMINATION OF RATE OF RETURN FOR RLECS MUST MEET ECONOMIC AND LEGAL CONSTRAINTS FOR SUSTAINABILITY OF UNIVERSAL SERVICE POLICY AND FOR OVERALL FINANCIAL VIABILITY OF RLECS, WHICH IS A CHALLENGING AND COMPLEX TASK.

Preventing a confiscatory rate of return (a constitutional taking of property) for RLECs is a necessary but not a sufficient condition for ensuring sustainability of universal service policy in rural and remote areas. A taking is simply the constitutional limit on how far government intervention may go so as to not threaten the financial viability of the overall firm. However, the continued availability and affordability of voice and broadband services to certain customers and certain areas may be at risk if the Commission prescribes a rate of return that is too low to attract investment, even if not so low as to be unconstitutionally confiscatory. Faced with such a rate prescription, RLECs may need to make prudent business decisions to discontinue service or defer investments to certain customers and/or areas in order to maintain financial viability. This may render universal service goals unachievable for those customers and/or areas. As we explain in this paper, such financial risks to which RLECs may need to respond may arise from flaws in design of universal service and intercarrier compensation reform contained in the *CAF Order*.

We discuss how to recognize the design flaws in the *CAF Order* and their potential and likely effects on the financial viability of RLECs and the sustainability of the FCC's policy goals in the *CAF*

Order through several analytical steps. We start in this section with application of our previously-developed framework for designing sustainable universal service policies based on a distinction between *bilateral rules* as opposed to *unilateral rules*.[10] We emphasize the importance of understanding how to properly construct bilateral rules to better ensure their sustainability. In the next section we discuss specific flaws in the policy reforms in the *CAF Order*.

We continue the analysis in section III, explaining how setting the rate of return in the upper range can help ensure both financial sustainability of RLECs and sustainability of revised universal service policy in rural and remote areas. Prescribing a rate of return in the upper range of a zone of reasonableness is consistent with precedent and is justified by the circumstances and environment that RLECs face. Finally, we present a multi-period model demonstrating the need to ensure that RLECs have a fair opportunity to earn a reasonable rate of return means many of the choices they make are linked and cannot be set independently. However, the *CAF Order* reads as if the FCC is treating them as if they are independent. The result is that higher funding support – effectuated through use of a higher rate of return – in earlier periods must be provided to address the various flaws in the *CAF Order*, such as uncertainty of obligations, funding levels and financial risk in subsequent periods.

A. Flaws in Policy Design Can Threaten Sustainability of Universal Service Policy in Rural and Remote Areas. The FCC Needs to Properly Construct Universal Service Policy as a Bilateral Rule.

Regulation takes many forms. But, if we exclude direct supply of a product or service by government, all forms of regulation can be classified as either unilateral or bilateral rules. Unilateral

[10] Cherry, B. A., & Wildman, S. S. (1999), "Unilateral and Bilateral Rules: A Framework for Increasing Competition While Meeting Universal Service Goals in Telecommunications," in, *Making Universal Service Policy: Enhancing the Process Through Multidisciplinary Evaluation* (Cherry, B. A., Hammond, A., & Wildman, S. S., editors), Mahwah, NJ: Lawrence Erlbaum & Associates, pp. 39-58; Cherry, B. A. (1998), "Designing Regulation to Achieve Universal Service Goals: Unilateral or Bilateral Rules," in *Telecommunications Transformation: Technology, Strategy and Policy* (Levin, S. & Bohlin, E., eds.), Amsterdam, Netherlands: IOS Press, pp. 343-359.

rules are "performance requirements imposed by government on firms as a condition for providing service without any assurance by government that the affected firms will be able to generate revenues sufficient to cover the associated costs."[11] Government simply imposes unilateral rules on firms as a condition for doing business. Examples of unilateral rules are workplace safety requirements, minimum wage laws, taxes, and product reliability and safety standards.

Bilateral rules are usually accepted by the affected firms, and "differ from unilateral rules in that … firms receive some form of compensation or special consideration in exchange for meeting government-specified performance obligations."[12] Bilateral rules, in turn, are of two types. "*Bilateral agreements* are government-specified performance requirements that are coupled with financial compensation for costs associated with meeting the requirements."[13] However, other than providing the pre-specified level of compensation, government assumes no responsibility for the financial health of the firm. Lifeline and Link-up programs for telecommunications services, whereby ETCs provide service to low-income customers at discounted rates in exchange for funding, are example.

However, "*[b]ilateral commitments* are performance obligations accepted by firms in exchange for which government accepts some degree of responsibility and provides some form of assurance for the financial health of the firms taking on these requirements, including safeguards against the threat of regulatory expropriation of the investments required to provide service."[14] Bilateral commitments arise in circumstances where one or both parties are vulnerable due to having long-term sunk investments at risk in a situation where each has only imperfect alternatives to the other.

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[11] Cherry and Wildman, *supra* note 10, at 41.

[12] *Id*.

[13] *Id*. at 42 (emphasis in original).

[14] *Id*. (emphasis in original).

Historical monopoly franchises of public utilities, often described as "regulatory contracts", are a form of bilateral commitment. Under the franchise monopoly, government imposed numerous obligations, such as restrictions on prices and earnings as well as carrier of last resort (COLR) obligations. Government assurance took the form of restrictions on competitive entry and allowing the utility to recover prudently-incurred costs in its rates.

Sustainability of bilateral rules requires a proper matching of obligations imposed on a private entity with the form of compensation or government assurance that the entity will be able to perform such obligations. The FCC intuitively recognizes this necessity when it states that it "seek[s] comment on what Commission action may be appropriate to adjust ETC's existing service obligations as funding shifts to these new, more targeted mechanisms. We aim to ensure that obligations and funding are appropriately matched, while avoiding consumer disruption in access to communications services."[15] For bilateral agreements, sufficient compensation to fulfill the performance obligation is required. For bilateral commitments, government assurance includes providing conditions that enable the affected firm to remain a financially viable entity while taking on the performance obligations.[16] Flaws in designing a bilateral rule can render the obligations unachievable – and thus the rule unsustainable.

B. Rate of Return Represcription in the *CAF Order* Affects Sustainability of Interdependent Bilateral Rules.

The FCC's traditional policy determination of interstate rate of return for RLECs is made within a bilateral rule, and in particular a bilateral commitment. As reflected by the legal standards for FCC's determination of RLECs' rate of return, the FCC must select a rate of return within a zone of reasonableness with the assurance that the return will not be so low as to produce confiscatory rates while RLECs operate under the various state and federally imposed obligations.

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[15] *CAF Order* ¶ 1089.

[16] Cherry and Wildman, *supra* note 10, at 42.

Prior to the Telecommunications Act of 1996 and elimination of local exchange monopolies, the obligations associated with traditional universal service policy were embedded within the underlying bilateral commitment between government (requiring federal and state coordination) and telecommunications providers. The bilateral commitment remains for RLECs because in rural markets economies of scale still limit consumers' options for telecommunications and broadband services and RLECs are vulnerable to expropriation of sunk investments in plant and equipment.

With federal preemption of state franchise monopolies under the Telecommunications Act of 1996, universal service policy was also amended in Section 254 to better enable its sustainability in a competitive environment.[17] In section 254, Congress requires the creation of a new set of bilateral rules for achieving various universal service goals. These bilateral rules consist of creating various categories of universal service, whereby performance obligations are imposed on eligible telecommunications carriers (ETCs) in exchange for funding from associated federal universal service support mechanisms. One of these bilateral rules is the high cost funding support mechanism.

In the *CAF Order,* the FCC reforms the high cost support mechanism as well as intercarrier compensation, one component of which involves potential represcription of the RLECs' rate of return. The FCC's determination of the rate of return may affect the amount of funding that RLECs receive as ETCs under the *CAF Order,* both for high cost support and for transition of intercarrier compensation to a bill-and-keep system. In so doing, the FCC links the determination of the rate of return (a component of the underlying bilateral commitment) to the high cost support funding (which is a bilateral rule). The result is that rate of return represcription in the *CAF Order* simultaneously affects the sustainability of <u>interdependent bilateral rules</u>.

[17] Cherry, B. A. (1998), "Designing Regulation to Achieve Universal Service Goals: Unilateral or Bilateral Rules," in *Telecommunications Transformation: Technology, Strategy and Policy* (Levin, S. & Bohlin, E., eds.), Amsterdam, Netherlands: IOS Press, pp. 343-359, at 343-345.

III. SETTING THE RATE OF RETURN IN THE UPPER RANGE CAN HELP ENSURE BOTH FINANCIAL SUSTAINBILITY OF RLECS AND SUSTAINABILITY OF REVISED UNIVERSAL SERVICE POLICY IN RURAL AND REMOTE AREAS.

There are several reasons why setting the rate of return in the upper range is the appropriate choice for sustainable universal service policy under the revised high cost support funding mechanism. Setting the rate of return in the upper range is consistent with precedent. In this regard, RLECs are differently situated from price cap LECs. The prescribed rate of return must reflect these differences. In addition, there are numerous design flaws and uncertainties under the *CAF Order* for which a rate of return in the higher range can, at least in part, compensate.

A. There is Precedent for Prescribing a Rate of Return in the Upper Range

There is precedent for prescribing a rate of return in the upper range as protection against investment risks created by a rapidly evolving technology with consequences difficult to anticipate. In its *1990 Represcription Order*, the FCC selected a rate of return in the upper end of the "zone of reasonableness" based on concerns about a lag in infrastructure development.[18] Such concerns are even more compelling today, particularly given the FCC's imposition of new obligations on RLECs to expand investment to provide broadband in rural and remote areas.

There are also substantial changes in circumstances since the 1980's when the FCC prescribed the rate of return of 11.25%. Competition is now permitted as a matter of law, with the elimination of monopoly franchises for RLECs under the Telecommunications Act of 1996, creating greater uncertainty as to expected RLEC revenues. The threat of competition is much greater than the more limited form of bypass that existed when the FCC issued its *1990 Represcription Order*, as reflected in

[18] "[O]ur concern about the possibility of a lag in the deployment of advanced technologies counsels that we should exercise our judgment to select a rate of return in the upper part of the range of reasonable cost of capital estimates." *Represcribing the Authorized Rate-of-Return for Interstate Services of Local Exchange Carriers,* Order, 5 FCC Rcd. 7507 (1990) ¶ 203 (*1990 Represcription Order*).

the declining demand for switched access lines due to substitution by mobile and VoIP services. Moreover, the FCC expressly acknowledges that the "existing regulatory structure and competitive trends have placed many small carriers under financial strain and inhibited the ability of providers to raise capital."[19]

B. RLECS are Differently Situated from Price Cap LECs.

RLECS are differently situated from price cap LECs in several respects, which renders an appropriate rate of return for price cap LECs an inappropriate surrogate for the rate of return of RLECs. First, price cap LECs are under a different legal standard for prescription of rate of return, for which the FCC sees a narrower range of reasonable estimates of the cost of capital than for rate-of-return (ROR)-regulated companies.[20] Under this legal standard, the FCC requires the price cap LECs to accept the risk that they may experience earnings somewhat below the prescribed rate of return in exchange for the possible rewards of price cap regulation.[21]

Second, in the competitive environment promoted by the Telecommunications Act of 1996, the telecommunications industry is certainly less monolithic in its risk profile as compared to the franchise monopoly era. In the *CAF Order,* FCC recognizes the difference in financial risk to RLECs relative to price cap LECS, as illustrated by its bifurcated design of both universal service and intercarrier compensation reform for price cap LECs and ROR carriers.

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[19] *CAF Order* ¶ 285 (footnote omitted).

[20] "We see the range of reasonable estimates of the cost of capital that we have identified as considerably narrower than the broad zone of reasonableness described for [rate-of-return regulated companies]." *1990 Represcription Order* at note 314.

[21] "[W]e believe it is reasonable to balance the possible rewards of price cap regulation, and to reinforce the positive incentives those rewards provide, by requiring the carrier to accept the risk that it might experience earnings somewhat below the prescribed rate of return." *1990 Represcription Order* ¶ 218.

C. There are Numerous Design Flaws and Uncertainties under Universal Service and Intercarrier Compensation Reform in the *CAF Order* that Affect Sustainability of Universal Service.

There are numerous problems and challenges in the *CAF Order* that the FCC needs to address in further developing universal service reform. Opportunities to do so include reconsideration of the *CAF Order* and future reform of the contribution mechanism for federal universal service funding.

One problem is the imposition of the new obligation to provide broadband service to customers in rural and remote areas upon reasonable request, but with no increase in universal service funding support – making this a new mandate with no apparent provision for funding.[22]

As a general matter, there is no apparent attempt to determine whether the combination of new service requirements and limitations on support will provide sufficient funding to meet basic universal service policy goals. Sources of uncertainty and unpredictability in the *CAF Order* (including the *FNPRM*) raised in the *RLECs Petition for Reconsideration* include uncertainty regarding the adequacy of funding under the yet-to-be determined CAF mechanism for RLECs, the unknown impacts of new regression-based limitations on reimbursable capital and operating expenses, the potential reduction in the authorized rate of return, loss of support based on instances of competitive overlap (where "unsubsidized competitors" supposedly provide service), and potential increases in problems with phantom traffic and access avoidance behaviors during the transition to a mandatory zero rate for all switched services (except transit).

New stringent standards for obtaining waivers of support reduction rules and for requesting additional CAF ICC support heighten these concerns. The FCC's general rule on waiver requests permits filing of relatively brief, straightforward and inexpensive petitions for waiver. However, the

[22] There is also uncertainty as to the scope of this new obligation. For example, what does the standard "upon reasonable request" mean for broadband service, which the FCC has determined to be an information service and not a Title II common carriage service?

new high-cost waiver petition process requires submission of extraordinarily detailed information that appears extremely burdensome, if not impossible, for small companies to assemble and submit. The *CAF Order* does not appear to assess the impacts of these burdens on small companies. If this stringent waiver process is retained, it may be necessary for RLECs to terminate service to portions of their service areas if their petitions for additional USF and/or ICC support are denied. A waiver process operates like a safety valve by providing a mechanism to address a change in circumstances or unintended consequences. By imposing new stringent standards on the waiver process, the FCC appears to be closing off the use of this mechanism to address such situations.

One means of compensating for the above uncertainties is for the FCC to prescribe a rate of return in the upper range of the zone of reasonableness. A model illustrating how the various requirements and obligations specified in the *CAF Order* dictate a more generous rate of return is discussed in the following section.

D. Examining the Effects of Rate of Return in a Multi-Period Economic Model

Because rural carriers must turn to private capital markets to secure the funds required to invest in telecommunications infrastructure, providing support payments sufficient to enable rural carriers to earn fair returns on their investments was a necessary condition for a successful universal service program built around rural carriers.

In its recent *CAF Order*, the FCC has substantially changed the federal high cost fund for support to ETCs in several ways. Among, these changes, the FCC requires that ETCs supply broadband service in their service territories if they are to continue to receive support through the universal service program. Given that the changes differ between price cap LECs and RLECs, the following discussion will focus on changes applicable to RLECs. More specifically, the FCC's proposed changes involve six sets of policy decisions:

- Prices charged customers for services provided by rural LECs.
- Changing the maximum rate of return that RLECs would be allowed to earn on qualified assets.
- The amount of federal support that will be available to help cover the cost of providing service in rural areas is capped at approximately its current level, yet there is an additional obligation to provide broadband service.
- The conditions that must be satisfied for rural carriers to qualify for universal service support.
- Service requirements for participating ETCs, including COLR obligations.
- The requirement that participating RLECs provide broadband service within their service territories.

In this section of our paper, we present a formal model to illustrate how the unavoidable necessity of giving RLECs reasonable opportunities to earn fair returns on privately-financed capital investments while meeting new universal service obligations makes it impossible to make these decisions independent of each other. Because policy choice questions raised by the new broadband service requirement are for the most part similar to those that must be addressed through universal service policy to ensure the provision of basic telephone services in rural areas, we develop the model for a single service, which for convenience we will call telephony, to show the impact of the first five sets of policy issues listed above. However, the model also provides an appropriate framework for examining the implications of adding the broadband service requirement to the other requirements and restrictions in the *CAF Order*.

We start by pointing out the obvious: that prices and allowed rates of return cannot be set independently. Price is a critical factor in determining a company's earnings, and thus its rate of return. This reality is explicitly recognized in the legal standard "[t]he return must not be so low as to produce

rates that are confiscatory in the constitutional sense nor so high as to produce excessive rates for consumers."[23] *Assuming there is a range of prices that permit a LEC to earn a fair return on invested capital*, within that range price and rate-of-return vary inversely.

When the cost of providing service is sufficiently high that it is impossible for a LEC to be financially viable while charging prices deemed fair and appropriate by policymakers and while meeting service coverage goals, price and rate of return cannot be determined independently of policy decisions on the amount and allocation of external funds that can be used to help offset the cost of providing service in high cost areas. The model presented below illustrates this point and is used as a vehicle for demonstrating how other policy choices impact the relationship between price, rate of return, and the amount of external support required to ensure that RLECs and remain financially viable while contributing to the realization of universal service goals.

1. Financial viability as a constraint on policy

Let K be the cost of the physical plant required to supply voice service to residents in a representative rural market. The plant can be used to provide service for two periods before becoming obsolete or failing due to physical deterioration. It takes one period to get the plant in place and during this period, period 1, it cannot be used to provide service. Service is offered to customers during periods 2 and 3. Let p be the price charged for service and define $R(p)$ as predicted net revenue (revenue minus variable cost) each period if price is p and no customers are lost to competitors not present during period 1. Define p^* and p_j, respectively, as the price that maximizes R and a price determined by the regulatory authority to be just and reasonable (what we also refer to as fair). For local telephone markets that are less than fully competitive, it is generally accepted that $p^* > p_j$.

[23] See note 7, *supra*.

Finally let r be the minimum rate of return required to elicit RLEC investment in a monopoly market and define as the discount rate associated with r.[24]

To begin, consider the investment calculus if there is no government contribution to revenue or cost coverage and there is zero risk that customers will be lost to new competitors, so remaining risk is due entirely to factors other than competition that might impact demand or the cost of providing service. Assuming there are no policy constraints on the price it might charge, the (potential) LEC would invest K and serve the market if

(1)

If, as is generally assumed, $p^* > p_j$, and policy requires that LECs charge no more than a fair price, the LEC will invest in plant and serve the market only if the present discounted value of net revenues when price is p_j are greater than K. The altered investment calculus is reflected in the difference between equations (1) and (2).

(2)

Throughout much of the history of telephone regulation in the United States, regulation of prices and rates-of-return regulation were the standard response to situations described by both equations (1) and (2). Today the preferred policy response is to impose a cap close to an estimated fair price on the price a LEC might charge its customers. If (2) is not satisfied when price is p_j, the cost of plant exceeds the presented discounted value of expected net revenues and a LEC will be formed to offer local exchange service only if government provides sufficient support to make up the difference.

[24] We simplify by assuming that investment in plant is financed entirely by investors and dispense with the complications that arise when lenders are also a source of investment capital.

This is the only situation for which there is a good policy justification for providing support, and we assume this to be the case for the analysis that follows.

2. *Designing policies that allow for competition*

Let G be the present discounted value of payments during periods 2 and 3 that a LEC must receive if it is to offer service because it cannot cover its own costs at the government-determined fair price. The influence of the selection of a fair price and the need for private investors' to realize a fair return on their investment on the total amount of support that must be provided is reflected in equation (3).

(3)

Because $R(p^*)>R(p_j)$, selecting a higher value for p_j increases net revenues and reduces the amount of support that is needed. Thus, given the fair return on investment constraint and a policy objective that LEC investors not receive more than a fair return on investment due to over generous government support, price and the level of support must vary inversely and be jointly determined.

To this point we have ignored the possibility of competitive entry and its consequences. The reality is that ILECs serving most rural markets anticipate that competition from some combination of new entrants and firms already serving portions of their market will increase in the future, but the pace at which the new competition will emerge and geographic coverage that competitors will offer remain highly uncertain and likely will vary substantially among rural markets. To allow for possible, but uncertain, entry and its effect on LEC net revenues, assume that the probabilities the LEC faces new competition in its market in periods 2 and 3 are h and q, respectively, with both positive but less than one. $q>h$ if technological progress increases the likelihood of profitable entry over time, as is generally assumed. Let z be the fraction of $R(p_j)$ retained by the ILEC when a competitor also serves

the market. As before, d is the per-period discount rate. For this modified and more realistic description of a RLEC's market, the level of support the LEC would require to financially justify the investment necessary to serve the market is given by equation (4), where d and d^2 are the discount factors applied to period 2 and period 3 revenues, $(1-h)$ is the probability that the ILEC will not face new competition in period 2, $(1-q)$ is the corresponding probability that its market will not be more competitive in period 3, and h and q are the period 2 and period 3 probabilities that the LEC will suffer this loss in net revenue on sales.

(4)

It is intuitively obvious, but also apparent from inspection of (4), that (because $z<1$) the support required for a LEC to invest and offer service in the market must increase if either h or q increases (or if both increase) because this reduces expected future net earnings on sales. On the other hand, increasing z reduces required support.

3. The consequences of reducing RLEC support in the event of competitive entry or increasing RLEC obligations without increasing support

Note that the *CAF Order's* proposal that future entry may be justification for reducing or terminating support for rural carriers is 180 degrees counter to the logic expressed in equation (4). For markets where support is already required, the appropriate policy response to the possibility that a RLEC's net revenues may be reduced by competition in the future is to increase the level of promised support so ILECs will be willing to invest in the plant required to ensure that service will be provided in the future. The alternative is to make the availability of telephone service in the future contingent on uncertain entry by unregulated firms currently not serving the market.

Because support is not provided in a single lump sum up front, but is delivered through a series of smaller disbursements over time, if entry prompted a reduction or elimination of support payments the value of actual support received by the ILEC would be some fraction of G. To ensure that infrastructure investments remain financially justified, the per-period level of support must be increased to compensate for the possibility that in either or both of periods 2 and 3 they will not be received.

To formally demonstrate that the amount of per-period support must be increased to compensate for the possibility that it will not be received, assume that from period 2 on the ILEC receives a per period payment of g as long as there is no new competition. On the other hand, should competition materialize, the payment is received with probability α. If $\alpha=1$, $G=gd+gd^2$, and the situation is exactly as described by equation (4). If $\alpha=0$, support payments cease entirely when the ILEC faces new competition. As before, the probabilities the market will be served by competitors in periods 2 and 3, respectively, are h and q, and entry reduces the ILEC's per period net revenue to fraction z of its level without competition. Equation (5) is a modified version of (4) that allows for per period support payments to be terminated with probability α in the event the ILEC faces new competition.

(5)

The variable representing support payments, α, appears twice in the second set of terms multiplied by d on the right side of equation (5). This is the present discounted value of expected net revenues (including support payments) should the ILEC face competition during either or both of periods 2 and 3 with net revenues weighted by the likelihood the ILEC will face competition in each

period. Clearly as α gets smaller and the probability of continuing to receive universal service support when the market is more competitive falls, expected net revenues under competition decline. To maintain the equality of the two sides of (5), the lower policymakers set α, the higher must be either per period support, g, or the just and reasonable price, p_j. Or both might be increased by smaller amounts, but in combination. In any case, ensuring that ILECs find it attractive to invest in infrastructure requires an adjustment that will result in a higher rate of return on investment in the eventuality that the market does become more competitive.

Equation (5) was used to examine the implications of reducing assistance to RLECs charged with supporting universal service goals. It should be obvious that imposing costly new service obligations on these carriers, such as requiring provision of broadband service, without increasing support would similarly require an offsetting increase in the allowed rate of return.

4. The allowed rate of return must reflect the impact of policy changes and ambiguities on risk-averse private investors

To this point we have focused on the effects of alternative regulatory policies on a LEC's expected earnings and their implications for policy design. But RLECs, like other firms, are sensitive to financial risk. Like other risk-averse investors, to justify investments they require higher expected rates of return the less predictable are anticipated earnings and the larger is the range over which actual earnings may vary. Given the investment feasibility constraint represented by equation (5), the effect of reducing α is to increase the difference between the LEC's profits when there is no entry and its profits when entry occurs. LECs will respond to higher variability in realized profits by more heavily discounting future earnings. To ensure incumbent RLECs continue to invest in their markets' communications infrastructure, they must be compensated for this increase in risk by raising the allowed rate of return, again through some combination of higher per-period support payments and an

increase in the price a LEC is allowed to charge. Ambiguity in official universal service policy regarding how support levels or permitted prices are to be determined will similarly increase uncertainty regarding earnings in different states of the world and also dictate a higher allowed rate of return if rural ILECs are to make the investments needed to ensure that high quality communications services will be available to rural residents in the future.

5. The consequences of more stringent COLR waiver requirements

Waivers are a potential form of protection against the financial harm a rural ILEC would suffer should it find itself obligated as part of a bilateral commitment to provide service to customers for whom the sum of subscriber charges and attributable support payments fall considerably short of the cost of continuing their service. Changed procedures that diminish the likelihood of obtaining such a waiver or that delay its grant diminish the value of this source of protection to the LEC. If not compensated by offsetting reductions in the costs of meeting other requirements, the LEC would require increases in support payments, prices, or some combination of these two adjustments, if universal service obligations are to be sustained for the long term.

We close this section with a variation on the version of the model described by equation (4). But for a single new expression, $(d+d2)R_L$, on the right side of the equal sign, equation (6) is identical to equation (4). R_L is the net revenue realized on customers for whom a RLEC seeks release from COLR obligations. Because customers who generate revenue in excess of the cost of serving them make a positive contribution to a LEC's bottom line, we can safely assume that RLECs are losing money (i.e., $R_L<0$) on an ongoing basis on those customers for whom they request that COLR obligations be waived. Furthermore, a RLEC would not need to seek waiver of COLR obligations for customers it was losing to competing service providers.

(6)

From (6) it is clear that the larger is the ILEC's loss on COLR customers (R_L), the larger must be G if service is to be continued for non-COLR customers without raising their rates. Similarly, the longer the wait for relief from COLR obligations after a request for waiver is filed, the larger will be the LEC's accumulated loss on COLR customers which will have to be made up through either an increase in G or by raising the price of service.

6. The implications of financial viability as an unavoidable constraint on policy

The economic analysis presented in this sub-section provided a more formal demonstration of an unavoidable truth reflected in the legal principles discussed in the preceding sub-sections. Reliance on private firms as critical instruments for achieving policy goals requires that the financial viability of those firms be taken into account in policy design. The implications for communications policy are just as clear. If universal service policy is to continue to rely on RLECs to help achieve its goals for provision of communication services in rural areas, the impacts of various policy options on RLEC finances must explicitly be taken into account. Failure to recognize the legitimate financial needs of RLECs in the design of universal service policy unavoidably puts the policy goals themselves at risk. Nothing in the *CAF Order* suggests that such an analysis has been performed.

It is absolutely critical that the FCC recognize that the rate of return prescribed for RLECs cannot be established independent of the other elements of universal service policy. As demonstrated with the model presented in this subsection, reductions in support, costly new obligations like the provision of broadband service, and more stringent COLR waiver requirements must all be offset in a higher allowed rate of return. The same is true for other requirements and obligations for RLECs introduced as universal service policy is redesigned. Uncertainties regarding interpretation and implementation of new policies should be similarly compensated.

The model also showed that competition anticipated in the future is a reason to increase the allowed rate of return, not reduce it, because infrastructure investments made today must be repaid through future earnings. Because competition reduces the expected return on investment and increases uncertainty about realized returns, needed infrastructure investments will be forthcoming only if allowed rates of return are increased. It is also critical that policymakers recognize that if support is to be reduced as competition emerges, even larger increases in the allowed rate of return will be required to compensate investors for placing an additional stream of revenues at risk. Because the consequences of failure in policy design would be diminished service to rural residents whose lives universal service policy is supposed to improve, policy officials would be wise to err on the high side in setting the upper bound on RLECs' permitted rate of return.

IV. Conclusion

The FCC's reform of universal service and intercarrier compensation in its *CAF Order* affects the *simultaneous sustainability* of multiple policy goals. In particular, when represcribing the rate-of-return for RLECs, the FCC is, by regulatory design, creating interdependencies between the financial viability of RLECs and the availability of affordable universal service to rural and remote areas. For both legal and economic reasons, this regulatory design must enable the RLECs to remain financially viable firms.

To enhance our understanding of how to properly construct regulatory rules to better ensure their sustainability, we apply our framework of unilateral and bilateral rules. We explain why the legal standard for rate of return regulation of RLECs is a bilateral rule, requiring government assurance that the RLECs have the reasonable opportunity to remain financially viable firms. We also explain that universal service policy relying on funding support for its fulfillment is also a bilateral rule requiring

government assurance that the amount of funding support is sufficient for the private firms to meet the obligations that have been imposed. Represcription of RLECs' rate of return in the *CAF Order* therefore creates interdependent bilateral rules, and for which sustainability of the underlying policy goals requires that the RLECs remain financially viable.

We show that setting the rate of return in the upper range can help ensure both the financial sustainability of RLECs *and* sustainability of revised universal service policy in rural and remote areas. There is long-standing legal precedent for prescribing rate of return in the upper range for RLECs, and both legal and economic reasons for treating RLECs differently from price cap LECs. Furthermore, we apply a multi-period economic model to show that numerous design flaws and uncertainties under the *CAF Order* can be addressed, at least in part, by prescribing a rate of return in the upper range. Reductions in funding support, costly new obligations, more stringent waiver requirements, and uncertainties regarding interpretation and implementation of the *CAF Order* must all be offset by a higher rate of return.

Appendix B-Attachment 1

Professor Barbara A. Cherry CV

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EDUCATION

Ph.D., Northwestern University, Communication Studies, 1996
Graduate Dissertation Award in Communication Studies

J.D., Harvard Law School, 1980
M.A., Harvard University, Economics & Law 1980
National Science Foundation Fellowship in Economics

B.S., University of Michigan, Economics 1976
Summa cum laude, Phi Beta Kappa, Highest Honors in Economics

PROFESSIONAL EXPERIENCE

Academia

2006 – present: Professor, Department of Telecommunications, Indiana University, Bloomington, Indiana; Adjunct Professor of Law, Indiana University School of Law – Bloomington, Indiana
Conduct interdisciplinary research related to telecommunications policy and law, teaching undergraduate and graduate courses. Serving as co-faculty advisor to the Federal Communications Law Journal.

1999 – 2001: Associate Professor, School of Journalism, and Associate Director, James H. and Mary B. Quello Center for Telecommunication Management and Law, Michigan State University, East Lansing, Michigan
Conducted interdisciplinary research and taught graduate courses related to telecommunication policy, management and law. Planned and participated in policy-related conferences and symposia to facilitate collaboration of policy makers, scholars, industry members and consumer interest groups and to develop new policy alternatives.

1997 - 1999: Adjunct Assistant Professor, Northwestern University, Evanston, Illinois
Taught undergraduate, graduate and executive masters program courses related to the economic, legal and societal dimensions of communications policy and technology.

1996 - 1997: Visiting Van Zelst Professor, Department of Communications Studies, Northwestern University, Evanston, Illinois
Taught both graduate and undergraduate courses in telecommunications policy. Presented the Visiting Van Zelst Lecture in 1997.

Government

2002 - 2006: Senior Counsel, Office of Strategic Planning & Policy Analysis (Deputy Chief, Office of Plans and Policy, prior to reorganization), Federal Communications Commission, Washington, D.C.

Support the Chairman's Office and the Bureaus by conducting multidisciplinary policy research, reviewing Bureau items and representing the FCC at external conferences, workshops and other public fora. Facilitate development of FCC-Academic Research Workshop series to coordinate research agenda and studies with academia on communications public policy issues.

Private Sector

1993 - 1998: Director of Public Policy Studies, Ameritech

Responsible for identifying, researching and sponsoring public policy initiatives to keep Ameritech on the leading edge in the development of regulatory policy and analysis. Had primary responsibility for Ameritech's policy positions in areas such as universal service and regulatory symmetry. Have broad subject matter expertise in telecommunications policy issues, both legislative and regulatory, state and federal.

1983 - 1993: AT&T, Chicago

1991 - 1993: Director of Operations Analysis for State Government Affairs, AT&T

Supervised the following functions in ten midwestern states: product implementation, cost analyses and competitive analyses for all intrastate telecommunications services; support for AT&T state managers before state regulatory commissions; management of AT&T's access costs to local exchange carriers; revision and maintenance of intrastate tariffs; provision of human resource and professional development services; dissemination of region's financial performance; and tracking of region's expense budget.

1985 - 1991: Regional Attorney for State Government Relations, AT&T

Responsible for legal support for state legislative activities affecting AT&T in ten midwestern states, including drafting and analyzing legislation, committee hearing testimony, and company position papers. Principal author and negotiator in rewriting telecommunications regulatory laws in nine states. Negotiator for other legislative issues, including municipal and state rights of way, taxation, marketing and state procurement, environmental impact, employee benefits, and campaign financing/lobbying. Worked closely with AT&T lobbyists in developing political strategies and with management in preparing corporation positions on legislation.

1983 - 1985: Regulatory Attorney, AT&T Communications, Inc.

Practiced regulatory litigation in five midwestern states covering telecommunications issues before state regulatory commissions. Worked closely with subject matter experts and management in preparation of corporate positions on cases.

1980 - 1983: Associate Attorney, Schiff, Hardin & Waite, Chicago
Practiced civil litigation in federal and state courts in 200-attorney law firm.

Admitted to Illinois Bar

Member, Board of Directors, International Telecommunications Society, 2008 – present.

PUBLICATIONS

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Cherry, B. A., Hammond, A., & Wildman, S. S., (Eds.). (1999). *Making Universal Service Policy: Enhancing the Process Through Multidisciplinary Evaluation.* Mahwah, NJ: Lawrence Erlbaum & Associates.

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Cherry, B. A., "Maintaining Critical Legal Rules to Enable Sustainable Communications Infrastructures," presented at *Dynamical Jurisprudence: Law as a Complex System,* Georgia State University College of Law, Atlanta, Georgia (February, 2008).

Cherry, B. A., "Telecom Regulation and Public Policy – 2007: Undermining Sustainability of Consumer Sovereignty?" presented at *The State of Telecom – 2007,* Columbia Institute for Tele-Information, New York, New York (October, 2007).

Cherry, B. A., "Consumer Sovereignty: Redrawing the Boundaries Between Industry-Specific and General Business Legal Regimes for Telecommunications and Broadband Access Services," presented at the *35th Annual Telecommunications Policy Research Conference,* Arlington, Virginia (September, 2007).

Cherry, B. A., "Regulation and Infrastructure Economics" presented at *BigHook 2007,* Woods Hole, Massachusetts (August, 2007).

Cherry, B. A., "Pursuing Telecommunications Legislation Through a Systems Approach to Policymaking Processes," presented at *11th World Multiconference on Systemics, Cybernetics and Informatics (WMSCI 2007)*, Orlando, Florida (July, 2007).

Cherry, B. A., & Bauer, J. M., "Complex Systems Approach to Policymaking for Telecommunications," presented at *11th World Multiconference on Systemics, Cybernetics and Informatics (WMSCI 2007)*, Orlando, Florida (July, 2007).

Cherry, B.A., "Reviewing Telecom Policy from a Complexity Theory Perspective," presented at *Economics of Exchange Commons: The Status, Functions and Utility of Infrastructure,* Columbia Institute for Tele-Information, Columbia Business School, New York, NY (November, 2006).

Cherry, B. A., "Designing a Next-Generation Legal and Regulatory Framework," presented at *Toward a New Communication Policy Paradigm*, 2006 Quello Communication Law and Policy Symposium, Washington, D.C. (April, 2006).

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Cherry, B. A., "Improving Network Reliability: Liability Rules Must Recognize Investor Risk/Reward Strategies" presented at the *30th Telecommunications Policy Research Conference,* Alexandria, Virginia (September, 2002).

Cherry, B.A., "Utilizing 'Essentiality of Access" Analyses to Mitigate Risky, Costly, and Timely Government Interventions in Converging Telecommunications Technologies and Markets" presented at the *30th Telecommunications Policy Research Conference,* Alexandria, Virginia (September, 2002).

Cherry, B. A., "Crisis of Public Utility Deregulation and the Unrecognized Welfare State" presented at the *29th Annual Telecommunications Policy Research Conference*, Alexandria, Virginia (October, 2001).

Cherry, B. A., "Symposium Theme and Framework" presented at *Regulatory Evolution or Revolution: What Changes are Needed to Address the Unpredictability of Communication Technology*, The Second Telecommunication Policy and Law Symposium of the Quello Center for Telecommunication Management & Law and the Michigan State University-Detroit College of Law Law Review, Washington, D.C. (April, 2001).

Cherry, B. A., "Preventing Flawed Communication Policies by Addressing Constitutional Principles" presented at the *Inaugural Telecommunications Policy and Law Symposium,* sponsored by the Quello Center for Telecommunication Management & Law and the Michigan State University-Detroit College of Law Law Review, Washington D.C. (April, 2000).

Cherry, B. A., "The Irony of Telecommunications Deregulation: Assessing the Role Reversal in U.S. EU Policy" presented at the *27th Telecommunications Policy Research Conference*, Alexandria, Virginia (September, 1999).

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- • *The 2nd Annual Conference of the Consortium for Research on Telecommunications Policy,* Northwestern University, Evanston, Illinois (May, 1996).
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International

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Cherry, B. A., Session Chair and workshop participant, by invitation only, *Complexity and Large Technical Systems,* Meersburg, Germany (May, 2008).

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Cherry, B. A., Cherry, B. A., "Applying the Mandates of the Telecommunications Act of 1996 to OSS," presented at New Millennium OSS, PCN Conference, Hilton Head, South Carolina (April, 2000).

Cherry, B. A., "Public Policy Impacts on Use of the Internet," presented at the ICM 4th Annual Strategic Telecom Pricing Conference, Las Vegas, Nevada (January, 2000).

Cherry, B. A., "Strategic Telecom Pricing: Understanding Your Options as a Provider," presented at the ICM 4th Annual Strategic Telecom Pricing Conference, Las Vegas, Nevada (January, 2000).

Cherry, B. A., "Addressing the Regulatory and Competitive Pressures on Next Generation OSS," Next Generation OSS, ICM Conference, Chicago, Illinois (September, 1999).

Cherry, B. A., "Addressing IP Telephony Regulatory Issues," presented at ICM Carrier Class IP Telephony Conference, Chicago, Illinois (June 1999).

Cherry, B. A., "Regulation Under TA96: Effects on Pricing Practices," presented at *Strategic Telecom Pricing Conference*, sponsored by ICM, New Orleans, Louisiana (January, 1999).

Cherry, B. A., "Affordability: Myths v. Reality," presented at *Illinois Commerce Commission Workshop on Universal Service* (June, 1998).

Cherry, B. A., "Limits to Regulation: Telecommunications Economics Meets the Law," presented at *Public Utility Research Center Annual Conference*, University Of Florida, Gainesville, Florida (February, 1998).

Cherry, B. A., "Universal Service: Federal Developments," presented at *1997 Regional Telecommunications Law Conference,* sponsored by Law Seminars International, Minneapolis, Minnesota (September, 1997).

Cherry, B. A., "Universal Service Contribution and Support Programs," presented at *Putting the Pieces Together: Universal Service/Access Reform Conference*, Bowie State University, MD (May, 1997).

Cherry, B. A., "The Federal-State Joint Board Recommendations on Universal Service: Are They Sustainable With Competition?" presented at *The Fourth Annual Conference: Universal Service '97,* sponsored by Telecommunications Reports, Washington, D.C. (January, 1997).

Cherry, B. A., "Fulfilling Universal Service Goals: Promises, Requirements or Commitments," presented at *Universal Service: Deregulation & Competition in Telecommunications,* sponsored by IBC, Bethesda, Maryland (December, 1996).

Cherry, B. A., "Universal Service and Access Charge Reform," presented at *The Fourth Annual Conference: Rethinking Access Charges & Intercarrier Compensation,* sponsored by Telecommunications Reports, Washington, D.C. (April, 1996).

Cherry, B. A., "FCC Docket 95-115: Expanding Telephone Service Subscribership," presented at *The Third Annual Conference: Universal Service '96*, sponsored by Telecommunications Reports, Washington, D.C. (January, 1996).

Cherry, B. A., "Regulatory Treatment: Asymmetry v. Symmetry," presented at Workshop Number 8 of the Local Competition Workshops, Wisconsin Public Service Commission, Docket No. 05-TI-138, Madison, Wisconsin (October, 1995).

Cherry, B. A., "Universal Service: What Does and Should It Mean in the U.S.", presented at the Illinois Commerce Commission Telecommunications Policy Committee Meeting, Chicago, Illinois (September, 1995).

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International

Cherry, B. A., "The Dark Side of Deregulatory Broadband Policies: The Rise of Shadow Common Carriage and Societal Systemic Risk," presented at the *Annual Meeting of the Taiwan Communications Society*, Taipei, Taiwan (September, 2011).

Cherry, B. A., "Can Institutional Governance Evolve With Increasing Complexity of Human Activities?" presented at Plenary Session: Envision the Future of Telecommunications, *18th Biennial Conference of the International Telecommunications Society*, Tokyo, Japan (June, 2010).

Cherry, B. A., "Telecommunications Policy in the Digital Age" presented at the *International DTV Forum & Conference,* Taipei, Taiwan (November, 2004).

Cherry, B. A., Instructor in Telecommunications Sector Training, *Regulatory Training Program for SIRESE*, Public Utility Research Center, University of Florida, La Paz, Bolivia (August, 2001).

Cherry, B. A., Workshop participant, by invitation only, at *Practice and Possibilities for Infrastructure Technology Independent Regulation of Interconnection and Access in a Converging Environment*, organized by the ICT Section of the Faculty of Technology, Policy and Management of the Delft University of Technology, Delft, The Netherlands (April, 2001).

Cherry, B. A., "New Funding Mechanisms for the USO," presented at A Regulation Initiative Conference, London Business School, United Kingdom (April, 1999).

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United States

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International

Cherry, B. A., "Reply of Barbara A. Cherry to Memorandum of Michael Ryan Dated 30 August 2010," on behalf of the Consumer Groups, *Obligation to Serve*, Canadian Radio-Television and Telecommunications Commission (CRTC), Telecom Public Notice CRTC 2010-43 (September 20, 2010).

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Cherry, B. A., "Evidence of Prof. Barbara A. Cherry on Behalf of Public Interest Advocacy Centre," *Review of Regulatory Framework for Wholesale Services and Definition of Essential Services,* Canadian Radio-television and Telecommunications Commission, Telecom Public Notice CRTC 2006-14, Canada (March 15, 2007).

Appendix B-Attachment 2

Professor Steven H. Wildman CV

STEVEN S. WILDMAN
Curriculum Vitae

CONTACT INFORMATION

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EDUCATION

Ph.D., STANFORD UNIVERSITY, Economics, 1980.

M.A., STANFORD UNIVERSITY, Economics, 1977.

B.A., WABASH COLLEGE, Economics, 1971.

PRESENT POSITIONS

MICHIGAN STATE UNIVERSITY, Department of Telecommunication, Information Studies, and Media, .James H. Quello Professor of Telecommunication Studies.

MICHIGAN STATE UNIVERSITY, Quello Center for Telecommunication Management & Law.
Co-Director

ACADEMIC AND PROFESSIONAL EXPERIENCE

Northwestern University, Department of Communication Studies, 1988-1999.
Associate Professor

Northwestern University, Program in Telecommunications Science, Management & Policy, 1990-1999. Director

ECONOMISTS INCORPORATED, 1983 - 1988.
Senior Economist

UNIVERSITY OF CALIFORNIA, Los Angeles, Department of Economics, 1979 - 1983.
Assistant Professor

RAND CORPORATION, 1981 - 1983.
Consultant

FELLOWSHIPS AND AWARDS

Journal of Media Economics Award of Honor for Scholarly Contributions and Inspiration to the Filed of Media Economics, 2010

International Telecommunications Education and Research Association Distinguished Research Award, 2010

Van Zelst Research Professor of Communication, Northwestern University, 1996-1997

McGannon Award for Social and Ethical Relevance in Communication Policy Research for 1992.

Ameritech Research Fellow, Northwestern University, 1990 - 1991.

Ameritech Research Professorship, Northwestern University, 1989 - 1990.

National Science Foundation Fellowship, 1974 - 1977

PUBLICATIONS

Books

International Trade in Films and Television Programs, with Stephen E. Siwek, Ballinger, 1988.[1]

Video Economics, with Bruce M. Owen, Harvard University Press, 1992.[2]

Electronic Services Networks: A Business and Public Policy Challenge, co-edited with Margaret E. Guerin-Calvert, Praeger Publishers, 1991.[2]

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[1] Senior author.
[2] Equal joint author.

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"Modeling the Efficiency Properties of Spectrum Governance Regimes," with J. M. Bauer and C. Y. Ting, *INFO*, Vol 8(2) (2006), 83-96..[1]

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[3] Second author

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Telecommunications Policy, referee
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OTHER PROFESSIONAL ACTIVITIES

Co-convener, conference on telecommunications free trade zones, Northwestern University, March 30, 1992. Sponsored by the Annenberg Washington Program of Northwestern University and the Illinois Commerce Commission.

Convener, half-day conference on electronic services networks at Northwestern University, April 9, 1990.

Co-convener, day-long Washington, D.C. conference on electronic services networks sponsored by the Annenberg Washington Program, February 23, 1990.

Member, Editorial Board, *Journal of Media Economics*.

Member of Organizing Committee for the Nineteenth and Twentieth Annual Telecommunications Policy Research Conference, Solomon Island, MD.

Member, Executive Committee, Consortium for Research in Telecommunications.

Organizer, 1996 Conference on Telecommunications Policy and Strategy of the Consortium for Research in Telecommunications Policy, Evanston, IL, May 10,11, 1996

Co-organizer, Telecommunication Policy and Law Symposium: "Preventing Flawed Communication Policies by addressing Constitutuinoal Principles", Washington, D.C., April 18, 2000.

Member, National Research Council Broadband Last Mile Committee, 1999-2001.

Vice-Chair, TPRC Board of Directors, 2004-Present

Co-Editor, *Journal of Media Economics*, Fall 2004-2008.

Member of Board of Directors, International Telecommunications Education and Research Association, Fall 2005-present.

Co-Organizer, 2008 Conference of the International Telecommunications Education and Research Association

Appendix C

Professor Randall Billingsley Statement: In Re: Interstate Rate of Return Represcription Report and Order of Further Notice of Proposed Rulemaking, FCC 11-161, November 18, 2011

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20544

In the Matter of	)	
	)	
Interstate Rate of Return Represcription	)	
Report and Order and Further Notice of Proposed	)	
Rulemaking, FCC 11-161, November 18, 2011	)	**WT Docket No. 10-208**
("ICC/USF Reform Order/FNPRM")	)	
	)	
	)	

STATEMENT OF DR. RANDALL S. BILLINGSLEY, FRM, CRRA, CFA

January 18, 2012

STATEMENT OF RANDALL S. BILLINGSLEY

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EXHIBITS TO STATEMENT

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20544

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Report and Order and Further Notice of Proposed	)	
Rulemaking, FCC 11-161, November 18, 2011	)	**WT Docket No. 10-208**
("ICC/USF Reform Order/FNPRM")	)	
	)	
	)	

STATEMENT OF RANDALL S. BILLINGSLEY

I. INTRODUCTION

Q. Please state your name, occupation, and business address.

A. My name is Randall S. Billingsley. I am currently Visiting Professor of Finance at Wake Forest University and am also a finance professor at Virginia Polytechnic Institute and State University. I also act as a financial consultant in the areas of cost of capital analysis, financial security analysis, and valuation. More details on my qualifications may be found in Billingsley Exhibit No. RSB-1. My current university address is: Schools of Business, Wake Forest University, P. O. Box 7659, Winston-Salem, NC 27109.

This statement and the five exhibits present my independent professional opinions and are not presented by me as a representative of Wake Forest University or Virginia

Polytechnic Institute and State University.

II. PURPOSE OF STATEMENT AND SUMMARY OF CONCLUSIONS

A. PURPOSE OF STATEMENT

Q. What is the purpose of your statement in this proceeding?

A. The purpose of my statement is to respond to the Federal Communications Commission's (FCC's) recent Report and Order and Further Notice of Proposed Order Rulemaking (FCC 11-161, November 18, 2011, "ICC/USF Reform Order/FNPRM"), which requests comments on the potential represcription of a modified version of legacy universal service support for rate of return carriers.[1] The FCC argues that there is evidence that the current interstate rate of return of 11.25% no longer reflects the current cost of capital. Indeed, the FCC's preliminary analysis suggests that the authorized rate of return should be no more than 9%. However, no evidence is provided to support this position. Notwithstanding this, the FCC asserts that the rate of return should be re-evaluated to assure that rate of return carriers can both attract capital on reasonable terms and to encourage economically appropriate network investments.

More specifically, the purpose of my statement is to provide empirical evidence on the

[1] ICC/USF Reform Order/FNPRM ¶ 1044.

current forward-looking weighted average cost of capital (WACC) for rural local exchange companies (RLECs), as proxied by the average of a sample of rural rate of return local exchange service providers (RLEC sample data). Thus, I estimate the cost of debt, cost of equity, capital structure, and overall WACC for use in determining the authorized interstate rate of return for RLECs in the current environment.

Importantly, my findings contradict the FCC's unsupported preliminary assertion that this rate of return should be no more than 9 percent. In providing this evidence, my statement also responds to the FCC's request for comments on the appropriate methodology and data that should be used in estimating the capital costs of rate of return carriers. In so doing, I discuss the issues associated with relying on book vs. market value-based capital structures, present the most appropriate method for identifying publicly-traded surrogate firms for non-publicly traded RLECs, and apply the most appropriate methods for estimating the RLECs' capital costs. While my empirical analysis relies, in part, on well-accepted traditional cost of capital methods, it also presents alternative methods that better reflect the costs borne by RLECs in attracting capital in current, highly competitive markets.

Q. Does the FCC provide any guidance concerning how the RLECs' cost of capital should be calculated for the purposes of this proceeding?

A. No, not directly. The apparent purpose of the FCC is to solicit comments on the appropriate methodologies that should be used to estimate RLECs' capital costs and to

obtain empirical evidence concerning specific costs in the current environment. This lack of guidance is challenging given that the FCC only provides between November 18, 2011, and January 18, 2012, for interested parties to critically evaluate competing cost of capital methodologies as they apply to RLECs and to complete the extensive statistical analyses necessary to produce specific cost of capital estimates. It is particularly puzzling for the FCC to request such comments given that it has already opined on many of the same issues in the context of unbundled network elements (UNE) cost analysis in its Triennial Review Order and the Verizon Arbitration Order, both of which are discussed below.[2] In the absence of more specific guidance from the FCC concerning the preferred cost of capital estimation methodology for RLECs, my analysis exemplifies the best approach given available data.

B. SUMMARY OF CONCLUSIONS

Q. Would you please summarize your assessment of how the cost of capital should be estimated for RLECs?

A. Yes. The components of risk that should be reflected in RLECs' cost of capital are captured

[2] In Re Review of the Section 251, Unbundling Obligations of Incumbent Local Exchange Carriers, First Report and Order on Remand and Further Notice of Proposed Rulemaking, FCC 03-36, released August, 21, 2003, hereinafter TRO. *In the Matter of Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket No. 00-218, and *In the Matter of Petition of AT&T Communications of Virginia Inc., Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia Corporation Commission Regarding Interconnection Disputes With Verizon Virginia Inc.*, CC Docket No. 00-251, Memorandum Opinion and Order, DA 03-2738, released August 29, 2003, ¶90, hereinafter Verizon Arbitration Order.

in forward-looking, market-based measures of the cost of equity, the cost of debt, and capital structure. These data should be drawn from competitive markets. While it has been historically common in regulatory practice to use market value-based estimates of the cost of equity, it has also been all too common to rely on backward-looking, book value-based estimates of the historical cost of debt. In determining the overall cost of capital in providing local exchange services, the cost of debt and cost of equity should both rely on forward-looking market-related data. Ideally, the WACC should be calculated using the implied *market* value-based proportionate reliance of the average RLEC on each respective capital source. Exclusive reliance on book value-based capital structures is inconsistent with financial theory, at variance with commonly-accepted financial practice, and contradicts the tenets of the FCC's total element long-run incremental cost (TELRIC) pricing approach for UNEs and the principles set forth in the TRO. The paucity of up-to-date data on debt prices requires that capital structures be measured using the *book* value of debt. It is critically important to also use the *market* value of equity in conjunction with market-based equity and debt costs in calculating overall capital costs.

While the current proceeding addresses RLEC capital costs, it stands to reason that the FCC's previously-stated cost of capital positions should apply to RLECs only with modifications that respect the unique challenges encountered in providing rural local exchange services. Forward-looking risk will not be reflected accurately in a RLEC's cost of capital unless all of the underlying component capital costs for which data are available are estimated using forward-looking, market-based data.

It would be best to estimate the capital costs for publicly-traded firms *solely* providing rural local exchange services. However, there are no such companies for which data are available. Thus, given realistic limitations on data availability and reliability, the best approach to identify proxy firms is to rely on a portfolio of publicly-traded companies that is demonstrably comparable to the risk profile of the average RLEC, as proxied by the average RLEC sample data. Such reliance applies objective, market-based data on firms operating in a competitive market to cost of capital estimation.

Q. Would you please summarize your findings concerning the current cost of equity capital associated with providing rural local exchange services?

A. Yes. Consistent with the above principles, my analysis uses objective market data to determine the average RLEC's cost of equity capital from three distinct but complementary approaches. Because the average RLEC does not have equity trading in the market, there is no directly observable market evidence on its cost of equity capital. Consequently, it is necessary to infer the average RLEC's cost of equity using available market data for publicly-traded firms that are, as a group, comparable in risk to the average RLEC.

In the *first* approach I apply the discounted cash flow (DCF) model to a group of firms identified as comparable in risk to the average RLEC. An average cost of equity capital is calculated by applying the DCF model to this group of comparable firms in order to

provide an objective, market-determined cost of equity capital for the average RLEC. In the *second* approach, I apply the capital asset pricing model (CAPM) to estimate the average RLEC's cost of equity capital using the same group of publicly-traded firms that are comparable in risk to the average RLEC. In applying the CAPM, I conduct a risk premium analysis that reflects current capital market expectations. Consequently, this analysis uses forward-looking, market-based expectations rather than rely exclusively on historical risk premium data. In the *third* approach, I apply the DCF model to the firms in the S&P 500 index to measure the cost of equity of average-risk firms operating in a competitive environment. As discussed below, reliance on the S&P 500 is based, in part, on the FCC's previous clarification that the index is a "… useful benchmark for the risk faced on average by established companies in competitive markets" (Verizon Arbitration Order, p. 41, §90, full citation below). Thus, I apply the DCF model to the S&P 500 to provide a conservative, market-based cost of equity capital estimate that corroborates the reasonableness of my average RLEC cost of equity estimates.

The cost of equity for the average RLEC is 12.55% using the comparable firm group DCF model approach. The CAPM approach indicates that the average RLEC's cost of equity capital is 12.62% *before* the necessary adjustment for firm size. Extensive research documents that small capitalization firms such as the average RLEC also require an additional risk premium of about 1.53%. Thus, the size-adjusted cost of capital for the average RLEC under the CAPM approach is 14.15%. The average of the DCF and CAPM cost of capital estimates is 13.35%. Billingsley Exhibit No. RSB-2 explains how my analytical

approaches are consistent with well-accepted regulatory and economic standards in cost of capital analysis. From these analyses, I conclude that the current cost of equity capital for the average RLEC is at least 13.35%. The reasonableness of this estimate is corroborated by the estimated cost of equity for the average member firm of the S&P 500 of 13.84%.

Q. **Would you please summarize your findings concerning the current cost of debt, the capital structure, and the weighted average cost of capital for the average RLEC?**

Yes. My analysis determines the cost of debt for the average RLEC to be at least 4.42% and its market value-based capital structure to consist of 20.94% debt and 79.06% equity. The cost of debt is proxied by the 4.42% average yield to maturity on 20-year maturity corporate bonds at the end November of 2011 that are rated A by Standard & Poor's. However, it is important to note that this proxy likely significantly understates the average RLEC's true cost of debt. RLECs can face challenging constraints on their borrowing capacity due, among other things, to their extremely small size, which increases their effective borrowing costs and creates costly uncertainty in securing needed capital. This effect is not, however, easily quantified.

Combining these capital structure weights and the cost of the debt with the above cost of equity estimate produces an overall cost of capital or WACC for the average RLEC of at least 11.48%. As explained above, the probable understatement of the cost of debt

suggests that the WACC is likely in excess of 11.48% for the average RLEC.

C. ORGANIZATION OF STATEMENT

Q. How is the rest of your statement organized?

A. Section III discusses the implications of the TRO and other related FCC actions for RLEC cost of capital estimation. Section IV describes the application of the DCF model and section V describes how the CAPM is applied to estimate the average RLEC's cost of equity. Section VI discusses how the cost of debt is estimated while Section VII describes the capital structure of the average RLEC and estimates its overall cost of capital. Finally, section VIII summarizes my conclusions.

III. PRIOR FCC CLARIFICATIONS CONCERNING COST OF CAPITAL ESTIMATION

A. TRIENNIAL REVIEW ORDER CLARIFICATIONS

Q. What are the key points in this section that are relevant to the determination of the RLEC capital costs?

A. The clarifications made by the FCC in the TRO support the following key points that influence my approaches to estimating RLEC capital costs:

- The cost of capital should rely on data that reflect competitive markets.
- The cost of capital should reflect the assumption of a forward-looking, technologically efficient network. This implies that the cost of capital should reflect forward-looking,

efficient capital structure, equity costs, and debt costs.

- The appropriate capital structure in cost of capital analysis is market value- rather than book value-based.
- The S&P 500 is a useful benchmark for assessing the average risk of firms operating in competitive markets, which is relevant in the telecommunications market. By implication, unregulated firms in diverse industries can provide reliable evidence concerning RLECs' capital costs.

Q. What specific clarifications does the FCC's TRO provide concerning the appropriate method for computing capital costs?

A. The TRO clearly indicates that the cost of capital should reflect the risks of a competitive rather than a regulated market. Indeed, the FCC states[3]:

> To ensure that UNE prices set by the states appropriately reflect the risks associated with new facilities and new services, we think it would be helpful to clarify two types of risks that should be reflected in the cost of capital. First, we clarify that a TELRIC-based cost of capital should reflect the risks of a competitive market. The objective of TELRIC is to establish a price that replicates the price that would exist in a market in which there is facilities-based competition. In this type of competitive market, all facilities-based carriers would face the risk of losing customers to other facilities-based

[3]TRO, p. 419, §680.

carriers, and that risk should be reflected in TELRIC prices.

This shows that the FCC believes that the cost of capital should be measured using data from competitive rather than just regulated markets. There is no reason to expect that the general cost of capital principles espoused by the FCC in addressing UNE capital costs would not apply with equal validity to the estimation of RLEC capital costs.

Q. What assumptions does the FCC make concerning the underlying telecommunications network for the purpose of computing the cost of equity capital?

A. As noted below, the FCC advocates calculating the cost of capital under the assumption of a forward-looking network using the most efficient technology[4]:

> … To calculate rates based on an assumption of a forward-looking network that uses the most efficient technology (i.e., the network that would be deployed in a competitive market), without also compensating for the risks associated with investment in such a network, would reduce artificially the value of the incumbent LEC network and send improper pricing signals to competitors. Establishing UNE prices based on an unreasonably low cost of capital would discourage competitive LECs from investing in their own facilities and thus slow the development of facilities-based competition.

The FCC's assertion that the cost of capital should reflect a forward-looking efficient network presumably implies that the cost of capital should also reflect the assumption of an optimal, sustainable capital structure and its associated forward-looking capital costs.

[4] TRO, pp. 419-420, §682.

If the FCC lowers the current authorized interstate rate of return below the level justified by current capital market conditions and expectations, this would endanger the ability of RLECs to make investments in the most efficient network technology and would "send improper pricing signals to competitors." My findings suggest that that the current authorized of rate of return of 11.25% should not be lowered.

B. VERIZON ARBITRATION ORDER CLARIFICATIONS

Q. Does the FCC take a position in the Verizon arbitration order concerning the appropriateness of market value- rather than book value-based capital structures in cost of capital analysis?

A. Yes. In reviewing the cost of capital determination process applied to Verizon, the FCC (specifically, the Wireline Competition Bureau) observes that[5]:

> … In calculating TELRIC prices, the theoretically correct capital structure is based on market values of debt and equity, not book values. In section 252(d)(1) of the Act, Congress specifically prohibited the use of traditional rate-base, rate-of-return ratemaking. The Commission has interpreted this section to require prices based on forward-looking costs, because forward-looking costs best replicate the costs a carrier would face in a market with facilities-based competition. Under the Commission's TELRIC rules, we

[5] Verizon Arbitration Order, p. 45, §102.

> calculate the investment necessary to build a network using the most efficient technology currently available. The TELRIC rules provide for the recovery of the investment in that efficient network through the use of economic depreciation and they provide for a return on that investment through a risk-adjusted cost of capital. The book value of Verizon's existing network is irrelevant for these purposes. Investors would not earn the return that they require if a cost of capital that is based on book value is applied to the economic value of their assets, given that rational investors value these assets at market value. Thus, the use of a capital structure based on market values, rather than book values, represents a departure from traditional ratemaking, but one that is entirely appropriate under the Act.

Thus, the FCC has previously supported the use of market value-based capital structures in cost of capital estimation. There is no reason to expect that this should not apply to the estimation of RLECs' cost of capital.

Q. Beyond the FCC's stated position, is the use of market value-based capital structures in cost of capital analysis consistent with well-accepted legal and regulatory standards?

A. Yes. In addition to being consistent with well-established financial practice and theory, the use of market value-based capital structures is consistent with the generally accepted Supreme Court precedents concerning what characterizes a reasonable rate of return for a regulated public utility (see Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia, 262, U.S. 679, 692-3, (1923) and Federal Power Commission

v. Hope Natural Gas Co. 320, U.S. 591, (1944)).

Market value-based capital structures are also consistent with the FCC's standard of considering the expected cost of capital (see First Report & Order, FCC 96-325, released August 8, 1996, paragraph 700). Because the expected cost of capital is, by definition, based on investors' expectations, all of its components must be based on expectations. The FCC's standard implies that the RLECs' costs of debt, costs of equity, and capital structures must all rely on the expectations reflected in market values. Thus, well-accepted financial practice and theory as well as the FCC's espoused principle indicate that market value-based capital structures are more appropriate than accounting-based capital structures in cost of capital analysis.

Q. Has the FCC provided any specific guidance concerning the usefulness of the unregulated, non-telecommunications companies in general and the S&P 500 in particular in measuring equity capital costs?

A. Yes. In the Verizon Arbitration Order the FCC observes that[6]:

> … the S&P 500 companies for which Verizon placed betas into the record does produce a useful benchmark for the risk faced on average by established companies in competitive markets.

The FCC consequently indicates that the unregulated, non-telecommunications companies constituting much of the S&P 500 index are a reasonable proxy for the average

[6] Verizon Arbitration Order, p. 41, §90.

risk faced by firms operating in competitive markets. By implication, the FCC indicates that the S&P 500 expected market return is an appropriate measure of the average risk faced by firms operating in competitive markets. My approach to identifying firms comparable in risk, as a group, to the average RLEC is consequently consistent with the FCC's previously stated position on this issue. Similarly, my use of the average cost of equity for the firms comprising the S&P 500 as a benchmark to corroborate the reasonableness of my results is also consistent with the FCC's guidance provided in the Verizon Arbitration Order.

IV. DCF MODEL ESTIMATES OF THE AVERAGE RLEC'S COST OF EQUITY CAPITAL

A. FORM OF THE DCF MODEL USED IN THE ANALYSIS

Q. What form of the DCF model do you use to estimate the average RLEC's cost of equity capital?

A. I use the constant growth form of the DCF model that assumes an indefinite or infinite holding period. Because most U.S. firms pay dividends quarterly, I use the quarterly form of the DCF model under the realistic assumption that such dividends are changed by firms once a year, on average in the middle of the year. Specifically, the cost of equity K is calculated as:

$K = [(D_0^q (1 + G)) / P_{mkt}] + G = [D_1^q / P_{mkt}] + G;$

where G is the most recent average three- to five-year annualized earnings per share growth rate projected by analysts, as reported by Zacks Investment Research Inc. (Zacks),

P_{mkt} is the average of the three most recent monthly closing prices (September to November of 2011) for the equity. D_o^q and D_1^q reflect the most recent annual and the anticipated next year amount of quarterly dividends, respectively. D_1^q is calculated as:

$$D_1^q = d_1 (1 + K)^{.75} + d_2 (1 + K)^{.5} + d_3 (1 + K)^{.25} + d_4,$$

where d_1 and d_2 are the quarterly dividends paid prior to the assumed yearly change in dividends and d_3 and d_4 are the two quarterly dividends paid after the given change in the amount paid by a firm. Thus, dividend D_1^q captures the quarterly payment of dividends that grow at rate G. Conservatively, I do not make an adjustment to capture the potential effect of flotation costs on the cost of equity. Billingsley Exhibit No. RSB-2 elaborates on the nature and applicability of the DCF model in estimating the cost of capital in regulatory proceedings. It also discusses the importance of adjusting for the payment of quarterly dividends.

B. APPROACH TO APPLYING THE DCF MODEL TO ESTIMATE THE AVERAGE RLEC'S COST OF EQUITY

Q. Specifically how do you apply the above DCF model to the average RLEC when it does not have equity trading in the marketplace?

A. Because the average RLEC does not have equity trading in the market, it is necessary to infer its cost of equity by applying the DCF model to a group of firms identified as comparable in risk to the average RLEC.

Q. What method is used to identify firms of comparable risk to the average RLEC?

A. I use a cluster analysis model to identify firms that are comparable in risk to the average RLEC. The two broad dimensions of the risk that a firm faces are used to compare firms. First, the financial risk of firms is measured and used as a basis of comparison. Second, business or operating risk is compared among firms. These dimensions are, in effect, averaged in a manner that generates a comprehensive risk profile. Thus, firms are not just compared on a characteristic-by-characteristic basis, they are compared in light of those chosen characteristics and the relationship among those characteristics. These measures of operating and financial risk are commonly used in the investment community.

A summary measure expresses the distance between each firm and the average RLEC. A group of the 20 firms that are closest to the average RLEC in terms of this summary distance measure is chosen for analysis. A more detailed discussion of this cluster analysis is provided in Billingsley Exhibit No. RSB-3.

Q. How do the individual measures of riskiness relate to the comparability of the group of firms in the cluster in terms of overall riskiness?

A. It may be tempting to single out one company in the cluster of comparable firms and incorrectly attempt to exhaustively compare its various risk and descriptive measures individually to those of the average RLEC. For example, someone might incorrectly try to compare *individual* cluster firms like Coca-Cola or Johnson & Johnson to the average RLEC. It might seem appropriate to ask how selling soft drinks or over-the-counter medical

supplies is like providing local telephone service. However, this is a misguided question because none of the *individual* companies identified in the cluster are precisely like the average RLEC in every respect. The firms are alternative investment opportunities that, *in the aggregate*, have overall risk similar to that of the average RLEC. The key conceptual point is that the portfolio of comparable companies, as a group, faces comparable risk as they compete for funding in the capital markets.

In summary, none of the individual firms in the portfolio of comparable firms are precisely like the average RLEC in terms of each individual measure of risk. The cluster should be viewed as a *portfolio* of firms that, *as a group*, are comparable in risk to the average RLEC.

Q. The comparable firms shown in Billingsley Exhibit RSB-4 do not include any telephone companies. Given that you are estimating the capital costs for RLECs, why is this so?

A. The overall sample of firms considered as potentially comparable to the average RLEC includes telephone companies. However, none of the telephone companies' screening characteristics generated distance measures that were close enough to those of the average RLEC to be included in the final sample of comparable companies. The cluster method has the major benefit of identifying comparable firms using objective rather than subjective criteria. Unlike many alternative methods, comparability is demonstrated rather than assumed. As discussed above, the use of unregulated, non-telephone companies is also consistent with the FCC's prior guidance in the Verizon Arbitration Order.

C. SPECIFIC DCF MODEL COST OF EQUITY ESTIMATES FOR THE AVERAGE RLEC

Q. What cost of equity capital do you estimate for the average RLEC using the DCF model?

A. Billingsley Exhibit No. RSB-4 lists the portfolio of 20 firms that are comparable in risk to the average RLEC and reports the average costs of equity for the portfolio that reflect Zacks long-term growth rate forecasts. The evidence indicates that the cost of equity for average RLEC is 12.55% using this approach. However, it is important to note that this estimate does not reflect the risk associated with the average RLEC's small size or any unique risk associated with its operation in the rural telecommunications market. The necessary small firm risk premium is quantified and applied in the CAPM analysis discussed below.

D. COST OF EQUITY OF THE AVERAGE S&P 500 INDEX MEMBER FIRM

Q. What is your estimate of the cost of equity for the average firm in the S&P 500 index?

A. The cost of equity for the average member firm of the S&P 500 is 13.84%. This is determined by applying the DCF model described in Billingsley Exhibit No. RSB-2 to all of the dividend-paying firms in the S&P 500 with at least two analysts having provided Zacks long-term growth rate forecasts. Closing prices for November of 2011 are used along with the realistic assumption of quarterly dividends. As noted above, in the Verizon Arbitration

Order the FCC states that it views the S&P 500 as a "… useful benchmark for the risk faced on average by established companies in competitive markets." The estimated cost of equity of the S&P 500 of 13.84% corroborates the reasonableness of my above-noted DCF-based estimate of the RLECs' cost of equity of 12.55%.

V. CAPITAL ASSET PRICING MODEL ANALYSIS OF THE AVERAGE RLEC'S COST OF EQUITY CAPITAL

A. APPROACH TO APPLYING THE CAPM

Q. What form of the CAPM do you use to estimate the average RLEC's cost of equity capital?

A. I use the common form of the model, which calculates the risk-adjusted rate of return K as:

$$K = R_f + \beta [R_m - R_f];$$

where R_f is the expected return on a risk-free security proxied by a U.S. Treasury instrument, β is the expected beta or systematic risk of the equity security, and R_m is the expected return on a broad index of equity market performance like the S&P 500.

Q. How and where do you obtain the beta coefficient data needed to estimate the average RLEC's cost of equity capital using the CAPM?

A. Because the average RLEC is not publicly-traded, it does not have its own equity trading in the market and therefore does not have the beta coefficient required by the CAPM. Thus,

as discussed above in my DCF analysis, it is necessary to identify a group of firms comparable in risk to the average RLEC that does have traded equity and therefore measurable beta coefficients. Consequently, the beta coefficients for the group of firms used in my DCF analysis that are identified in Billingsley Exhibit No. RSB-4 are relied on to estimate the cost of equity for the average RLEC. Specifically, the average beta of 0.89 for the group of firms is used in the CAPM equation presented above. The beta coefficients used in my CAPM analysis are supplied by Value Line, a widely-recognized provider of financial data and decision support systems for investors.

Q. How do you estimate the risk-free rate of return needed in the CAPM equation?

A. I use the 2.72% average yield to maturity on 20-year constant maturity U.S. Treasury bonds during November of 2011.

Q. How do you estimate the risk premium on a broad index of equity market performance for use in the CAPM?

A. I rely on my previously-noted estimate of the cost of equity capital for the average member firm in the S&P 500 index, which is 13.84%. Subtracting the above-noted 2.72% long-term U.S. Treasury bond yield to maturity from the S&P 500's expected return implies a risk premium of 11.12%.

Q. How does the equity market risk premium implied by current market expectations compare with the realized historical average?

A. The current implied equity market risk premium is high relative to historical realized premiums. When investors are doing well financially, they are optimistic and require relatively low risk premiums, but when investors are doing poorly, they are pessimistic and require relatively high risk premiums. It is consequently reasonable to find that the implied *expected* equity market risk premium is high in the wake of the recent financial crisis in the U.S., in light of the continuing economic crisis in Europe, and in response to the persisting uncertainties created by U.S. congressional deadlock over critically important fiscal matters such as the federal debt ceiling.

The high implied expected risk premium expresses the heightened compensation that investors are demanding to move into risky assets in a highly uncertain economic environment. For some perspective, Morningstar, a leading provider of cost of capital research and data, documents that the historical realized risk premium on large capitalization stocks between 1926 and mid-2011 is 6.72% (Morningstar, Inc., *Stocks, Bonds, Bills, and Inflation Valuation Update*, data through June, 2011, Chicago, IL, Table A-1). It is important to recognize that this is an average and that performance has varied significantly from that average over time. The current implied risk premium of 11.12% is realistic in light of that variability and current market conditions. Morningstar documents many years in which the realized premium exceeds 11.2%. For instance, the historical record shows realized risk premiums of 22.5% in 1980, 20.5% in 1985, 30% in 1995, 26.7% in 1997, and 22.7% in 1998 (Morningstar, Inc., *2010 Ibbotson Stocks, Bonds, Bills, and Inflation Valuation Yearbook,* Table A-1*,* Chicago, IL). Consequently, the poor performance

of U.S. equity markets over the last ten years is reflected in the current implied expected market risk premium as investors seek increased compensation for increased perceived risk. RLECs are forced to compete for funds in this environment and their capital costs manifest the enhanced need for investors to be compensated accordingly.

Q. What cost of equity capital do you estimate for the average RLEC under the CAPM approach?

A. Summarizing the results of the above analysis, I use a risk-free rate of return of 2.72%, an average beta of 0.89 for firms comparable in risk to the average RLEC, and an implied expected risk premium on the S&P 500 of 11.12%. These objective, market-determined data indicate that the average RLEC's forward-looking cost of equity capital is 12.62% *without* adjusting for the small capitalization of the average RLEC or any unique rural telecommunications market risk effect.

B. FIRM SIZE RISK PREMIUM ADJUSTMENT TO THE CAPM

Q. Does financial research support the need to add a risk premium to adjust the above CAPM equity cost in light of the higher risk associated with smaller capitalization firms such as representative RLECs'?

A. Yes. The following observation by Morningstar, summarizes the results of extensive financial research on the relationship between firm size and equity returns (Morningstar, Inc., *2010 Ibbotson Stocks, Bonds, Bills, and Inflation Valuation Yearbook,* Chicago, IL).

> One of the most remarkable discoveries of modern finance is that of a relationship between firm size and return. The relationship cuts across the entire size spectrum but is most evident among smaller companies, which have higher returns on average than larger ones. Many studies have looked at the effect of firm size on return. (p. 85)
>
> … The capital asset pricing model (CAPM) does not fully account for the higher returns of small company stocks. … This return in excess of that predicted by CAPM increases as one moves from the largest companies in decile 1 to the smallest in decile 10. The excess return is especially pronounced for micro-cap stocks (deciles 9-10). This size-related phenomenon has prompted a revision to the CAPM, which includes a size premium. (p. 90)
>
> … Small capitalization stocks are still considered riskier investments than large company stocks. Investors require an additional reward, in the form of additional return, to take on the added risk of an investment in small-capitalization stock. It is unlikely that in the future investors will require no compensation for taking on this additional risk. (p. 102).

Thus, there is extensive financial research that indicates that my above CAPM-based estimate for an average RLEC should be increased by a risk premium that compensates for the additional risk posed by small capitalization.

Q. How much of a size-related equity risk premium is appropriate for the average RLEC?

A. A small firm size premium of 1.53% is appropriate for the average RLEC given its extremely small size. This premium is based on an analysis of the relationship between equity performance and firm size between 1963 and 2010. The analysis provided by Duff & Phelps affords the opportunity to benchmark the firm size using various measures that do not require the target firm to be publicly-traded, which is the case for the average RLEC (*Risk Premium Report 2011*, Duff & Phelps, Chicago, IL). The size of the average RLEC is benchmarked using the 5-year average net income of RLEC sample data from 2006 to 2010 and the average total assets of RLEC sample data in 2010. The average net income for the RLEC data sample is $2,157,022 and the average total assets is $47,362,711. The Duff & Phelps report quantifies the extent to which the CAPM does not capture the small firm risk premium. On the basis of net income as a measure of size, the data justifies an additional premium beyond the CAPM estimate of between 1.28% and 1.57%, which is an average of 1.43%. Alternatively, using total assets as a measure of size, the data indicates an additional premium beyond the CAPM estimate of between 1.62% and 1.63%, which is an average of 1.625%. Averaging these estimates implies that a firm size risk premium of 1.53% should be added to the unadjusted CAPM estimate of the average RLEC's cost of equity capital.

This firm size premium makes sense in light of the fact that RLECs' face enormous risks that come with being so extremely small. RLECs face unique, undiversifiable risks that large telecommunications companies like AT&T and Verizon do not. These include fewer

diversified lines of business, less geographic diversity, and very challenging access to sources of financing. RLECs' capital costs consequently must include compensation for these unique elevated business and financial risks in competitive markets if they are to attract sufficient funds to continue providing essential local exchange services. Importantly, it would be inappropriate and potentially economically damaging to rely on CAPM cost of equity estimates for RLECs that are not adjusted for the empirically supported effect of small size. In bold contrast, there is no evidence that large telecommunications firms like AT&T or Verizon merit any size adjustment. Further, the firms in my cluster of publicly-traded comparable firms are large enough to be devoid of any significant firm size risk. It is consequently necessary to adjust the CAPM estimates generated by my portfolio of firms that, as a group, are demonstrably comparable to the average RLEC.

In summary, the CAPM approach produces a cost of equity for the average RLEC of 12.62% *unadjusted* for the firm size effect. Adding the above-discussed firm size premium of 1.53%, the appropriate CAPM-based estimate of the average RLEC's cost of equity is 14.15%.

VI. COST OF DEBT ESTIMATION

Q. How can the average RLEC's forward-looking cost of debt be empirically estimated?

A. The forward-looking cost of debt associated with providing local exchange service is

estimated by examining the yields on bonds with the same rating as the average issued by the firms in the comparable portfolio. Using a numerical dummy coding of bond rating categories, the average corporate Standard & Poor's bond rating for members of the comparable firm portfolio is between A- and BBB+, but closer to A-. As of the end of November of 2011, the average yield on 20-year maturity A-rated bonds is 4.42% (*Standard & Poor's Global Fixed Income Research*, November 2011).

VII. OVERALL RLEC COST OF CAPITAL ESTIMATES

Q. What capital structure, component costs of capital, and overall cost of capital do you use in estimating the average RLEC's overall cost of capital?

A. I estimate the average RLEC's overall cost of capital using the results of my above analysis and a market value-based capital structure for the firm. As discussed above, it is important to recognize that the use of market value-based capital structures should be relied on in estimating the average RLEC's overall cost of capital.

Q. What capital structure and component costs of capital do you use in estimating the average RLEC's overall cost of capital?

A. I use my estimated costs of equity and debt for average RLEC along with the average market value-based capital structure for the group of 20 firms shown to be comparable in risk to the average RLEC. The analysis uses a cost of debt of 4.42% and a cost of equity of from 12.55% to 14.15%, which implies an average cost of equity of 13.35%. As shown in

Billingsley Exhibit No. RSB-5, the current average market value-based capital structure for the portfolio of companies comparable in risk to the average RLEC is about 20.94% debt and 79.06% equity. Thus, the data and estimates in my analysis indicate that the average RLEC's overall cost of capital is at least 11.48%.

Q. Why have the current historically low interest rates not brought a commensurate decrease in the RLECs' capital costs?

A. It is all too easy to be misled into believing that all capital costs fall in tandem with the level of interest rates. Yet this is demonstrably incorrect. Decreases in interest rates do not necessarily bring an equivalent decrease in the overall cost of capital. For example, there is evidence that the equity risk premium is related inversely to the returns on low-risk benchmark debt securities. Thus, when interest rates decline, the equity risk premium widens and when interest rates rise, the equity risk premium narrows. Research on this phenomenon by Professors R. S. Harris and F. C. Marston quantifies this inverse relationship between interest rates and the expected equity risk premium. Specifically, their study finds evidence that the equity market risk premium is expected to change an average of -0.651 of changes in the level of long-term Treasury bond yields (R. S. Harris and F. C. Marston, "Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts," *Financial Management*, 1992, pp. 63-70). More recent work by Harris and Marsden also finds the same inverse relationship between expected risk premiums and interest rates ("The Market Risk Premium: Expectational Estimates Using Analysts Forecasts," *Journal of Applied Finance*, 2001, pp. 6-16). Thus, equity costs and interest

rates do not move perfectly in tandem, and equity costs fall less than interest rates in a declining environment.

The effect of lower interest rates on overall capital costs is also offset by the average RLEC's low relative reliance on debt relative to equity in funding its operations. As noted below, the average RLEC's market-based capital structure consists of about 80% equity and only about 20% debt. The net effect of current market conditions on overall capital costs balances the historically low cost of debt against markedly increased current equity return requirements. The apparent net effect is that overall capital costs have increased for the average RLEC. This presumably also reflects higher operating risks and the regulatory risk that the FCC could indeed possibly reduce the RLECs' authorized rate of return in the presence of higher perceived equity market risk and the implied capital costs.

VIII. SUMMARY OF CONCLUSIONS

Q. Would you please summarize your observations concerning the appropriate method to estimate RLEC capital costs and summarize your recommendation to the Commission concerning current RLEC capital costs?

A. Yes. The TRO and other FCC statements indicate that the cost of capital should be estimated using forward-looking, market-based measures of the cost of equity and the cost of debt. These data should be drawn from competitive, not just regulated markets.

Forward-looking risk will not be reflected accurately in the cost of capital unless all of the underlying component capital costs - both debt and equity - are estimated using forward-looking, market-based data.

The cost of debt and cost of equity should be weighted by the market value-based proportionate reliance of the rural local exchange service provider on each respective capital source. Reliance on book value-based capital structures is inconsistent with financial theory, at variance with commonly-accepted financial practice, and contradicts the tenets the FCC's TELRIC pricing approach.

Because there are no publicly-traded firms solely providing rural local exchange services, it is necessary to identify appropriate proxy firms in estimating the RLECs' cost of capital. This proxy applies objective, market-based data on firms operating in a competitive market to cost of capital estimation.

My analysis indicates that a forward-looking cost of equity estimate for the average RLEC using the DCF and CAPM approach is an average of 13.35%. The reasonableness of this result is corroborated by evidence that the expectations-based cost of equity for the average company in the S&P 500 index is 13.84%. I also find evidence that the pre-tax cost of debt for the average RLEC is at least 4.42%. Combining the average market value-based capital structure of 79.06% equity and 20.94% debt with the above costs of debt and equity produces an average pre-tax overall cost of capital or WACC of at least 11.48%.

Thus, I find evidence that contradicts the FCC's preliminary, empirically unsupported assertion that the authorized rate of return should be no more than 9%. Indeed, my findings indicate that, if changed at all, the FCC should increase the authorized rate of return.

Q. Does this conclude your statement?

A. Yes, it does.

Appendix C-Attachment 1

Professor Randall S. Billingsley CV

RANDALL S. BILLINGSLEY

January 2012

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APPOINTMENTS

2011 – current: Visiting Professor of Finance, Schools of Business, Wake Forest University

2010 – 2011: Assistant Department Head, Department of Finance, Virginia Polytechnic Institute & State University

2002 – 2011: Advisor, Student-Managed Endowment for Educational Development (SEED)
Virginia Polytechnic Institute & State University

Duties: Organize, advise, and instruct finance undergraduates and MBAs managing approximately $5.0 million equity fund on behalf of the Virginia Tech Foundation.

1994 - Current: Associate Professor of Finance
Virginia Polytechnic Institute & State University

1993: Vice President
Association for Investment Management and Research
(Subsequently renamed the CFA Institute)
Education and Programs Department

Duties: Project director, responsible for the development and design of education technology products. Projects included videos on options and futures analysis, ethical issues in the investment profession, and financial statement analysis for investment valuation and management.

Responsible for the design and offering of continuing education programs to meet the needs of AIMR's members in particular and the investment industry in general.

Associate Professor, On Leave of Absence
Virginia Polytechnic Institute & State University

1987-1992: Associate Professor of Finance
Virginia Polytechnic Institute & State University

1981-1987: Assistant Professor of Finance
Virginia Polytechnic Institute & State University

1978-1981: Lecturer of Finance
Texas A&M University

1977-1978: Lecturer of Economics
Research Assistant in Economics
Texas A&M University

Summers 1978, 1980: Research Associate
Texas Transportation Institute
Texas A&M University

Duties: (1978) Principal researcher and author of a study concerning design of optimal subsidy techniques for public transit projects. (1980) Co-author of research proposal for study of the projected economic impact of user charges on the Texas Gulf Intra-Coastal Waterway (proposal accepted and fully funded). Performed research concerning various policy issues in transportation economics.

PROFESSIONAL DESIGNATIONS

1986: Chartered Financial Analyst (CFA)
The Institute of Chartered Financial Analysts

1992: Certified Rate of Return Analyst (CRRA)
National Society of Rate of Return Analysts

2007: Financial Risk Manager (FRM)
Global Association of Risk Managers

EDUCATION

1982: Doctor of Philosophy in Finance, supporting field in Economics
Dissertation Title: "A Multivariate Analysis of Bank Holding Company Capital Note and Debenture Ratings"
Chairman: Dr. Donald R. Fraser
Texas A&M University

1978: Master of Science in Economics, supporting field in Statistics
Texas A&M University

1976: Bachelor of Arts in Economics
Texas Tech University

PRIMARY TEACHING AND RESEARCH INTERESTS

Teaching: Equity valuation and portfolio management; risk management/financial derivatives.

Research: Equity valuation methods, information uncertainty, and regulatory financial issues.

TEACHING HONORS

William E. Wine Award Teaching Achievement Award, Virginia Polytechnic Institute & State University, 2011.

Teaching Excellence Award, Pamplin College of Business, Virginia Polytechnic Institute & State University, 2008-2009.

Holtzman Outstanding Educator Award, Pamplin College of Business, Virginia Polytechnic Institute & State University, 2008-2009.

Teaching Excellence Award, Pamplin College of Business, Virginia Polytechnic Institute & State University, 2002-2003.

Holtzman Outstanding Educator Award, Pamplin College of Business, Virginia Polytechnic Institute & State University, 2002-2003.

Teaching Excellence Award, Pamplin College of Business, Virginia Polytechnic Institute & State University, 1986-1987.

Excellence in Teaching Award, MBA Association, Virginia Polytechnic Institute and State University, 1985-1986.

PUBLICATIONS

Books

Understanding Arbitrage: An Intuitive Approach to Financial Analysis, (Upper Saddle River, New Jersey: Wharton School Publishing, 2006), (Author listing: Randall. S. Billingsley).

Candidate Study Notes: CFA Exam Review, Authored material on equity valuation, portfolio analysis, and derivatives and alternative investments, which are in Volumes I and 3. (Cengage Learning: Mason, OH, 2008), (Author listing: Randall S. Billingsley, John Paul Broussard, John S. Howe, Edward Nelling, J. Clay Singleton, and E. Theodore Veit. Series Editor: Michael D. Joehnk).

Candidate Study Notes: CFA Exam Review, Authored material on equity valuation, portfolio analysis, and derivatives and alternative investments, which are in Volumes I and 3. (Cengage Learning: Mason, OH, 2009), (Author listing: Randall S. Billingsley, John Paul Broussard, Johan S. Howe, Edward Nelling, J. Clay Singleton, and E. Theodore Veit. Series Editor: Michael D. Joehnk).

Personal Financial Planning, (Cengage Learning: Mason, OH, 12th edition, 2010), (Author listing: Lawrence J. Gitman, Michael D. Joehnk, and Randall S. Billingsley).

PFIN, (South-Western College Publishing: Mason, OH, 2011, 2nd edition), (Author listing: Lawrence J. Gitman, Michael D. Joehnk, and Randall S. Billingsley). (Personal finance textbook related to above *Personal Financial Planning* book.)

Journal Articles - Refereed

"The 2008 Short Sale Ban: Liquidity, Dispersion of Opinion, and The Cross-Section of Returns of U.S. Financial Stocks, *Journal of Banking and Finance,* Vol. 35, No. 9, September 2011, pp. 2252-2266 (Author listing: Don M. Autore, Randall S. Billingsley, and Tunde Kovacs).

"Information Uncertainty and Auditor Reputation," *Journal of Banking and Finance*, Vol. 33, No. 2, February 2009, pp. 183-192 (Author listing: Don M. Autore, Randall S. Billingsley, and Meir Schneller).

"The Benefits and Limits of Diversification Among Commodity Trading Advisors," *Journal of Portfolio Management*, Vol. 23, No. 1, Fall 1996, pp. 65-80 (Author listing: R. S. Billingsley and D. M. Chance).

"Why Do Firms Issue Convertible Debt?" *Financial Management*, Vol. 25, No. 2, Summer 1996, pp. 93-99, (Author listing: R. S. Billingsley and D. M. Smith).

"Simultaneous Debt and Equity Offerings and Capital Structure Targets," *Journal of Financial Research*, Vol. 17, No. 4, Winter 1994, (Author listing: R. S. Billingsley, D. M. Smith, and R. E. Lamy).

"Regional Reciprocal Interstate Banking: The Supreme Court and the Resolution of Uncertainty," *Journal of Banking and Finance*, Vol. 16, No. 1, 1992, pp. 665-686, (Author listing: R. S. Billingsley and R. E. Lamy).

"Integration of the Mortgage Market," *Journal of Financial Services Research*, Vol. 6, 1992, 137-155, (Author listing: R. S. Billingsley, V. A. Bonomo, and S. P. Ferris).

"Units of Debt with Warrants: Evidence of the 'Penalty-Free' Issuance of an Equity-Like Security," *The Journal of Financial Research*, Vol. 13, No. 3, Fall 1990, pp. 187-199, (Author listing: R. S. Billingsley, R. E. Lamy, and D. M. Smith).

"Shareholder Wealth and Stock Repurchases by Bank Holding Companies," *Quarterly Journal of Business and Economics*, Vol. 28, No. 1, Winter 1989, pp. 3-25, (Author listing: R. S. Billingsley, D. R. Fraser and G. R. Thompson).

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PROFESSIONAL EDUCATIONAL SEMINARS PLANNED AND ORGANIZED FOR THE ASSOCIATION FOR INVESTMENT MANAGEMENT AND RESEARCH

(Subsequently renamed the CFA Institute)

"Corporate Financial Decision Making and Equity Analysis," New York, NY, February 2000. Conference Moderator: M. Kritzman.

"Risk Management," Boston, MA, March 1999. Conference Moderator: B. Putnam.

"Investing in the "New" Telecommunications Industry," New York, NY, September 1997. Conference Moderator: L. J. Haverty, Jr.

"Managing the Investment Professional," Chicago, IL, April 1996. Conference Moderator: R. S. Lannamann.

"Effective Risk Management in the Investment Firm," Boston MA, October 1995. Conference Moderator: G. L. Gastineau.

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PROFESSIONAL SERVICE

Board of Directors

Virginia Tech Services, chair of audit committee, 2005 – 2010.
Society of Utility and Regulatory Financial Analysts, 1993 – 2002.

Virginia Tech Faculty Senate

Senator, 2006 - 2009.

CFA Institute Activities
(Formally the Association for Investment Management and Research)
Professional service beyond duties performed as Vice President.

Grading Staff, Institute of Chartered Financial Analysts, June 1987.

Candidate Curriculum Committee, Institute of Chartered Financial Analysts, Quantitative Analysis Subcommittee, 1987-1989.

CFA Examination Analysis Team, Levels I-III, March 1988.

CFA Examination Grading Review Team, July 1988.

Faculty, CFA Refresher Course, Valuation: Equity, Charlottesville, VA, June 1992, June 1993, June 1994, UCLA, November 1994.

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Manuscript Referee for Selected Journals

Journal of Banking and Finance

Journal of Business Research

Journal of Financial Research

Journal of Futures Markets

Financial Review

Quarterly Review of Business and Economics

International Review of Economics and Finance

Journal of Business Research

SELECTED INVITED SPEECHES/WORKSHOPS

Paper presented at Wake Forest University and Rollins College, Spring 2011, “Short Sale Constraints and Dispersion of Opinion: Evidence from the Short Sale Ban on U.S. Financial Stocks,” Author listing: Don M. Autore, Randall S. Billingsley, and Tunde Kovacs.

Mubadala Development, “Company Analysis: Valuation, Forecasting, and Financial Modeling,” Abu Dhabi, UAE, April 2009.

The Richmond Society of Financial Analysts, “Reverse Financial Engineering and the Consensus Equity Valuation,” Richmond, VA, January 2004.

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Virginia Bankers Association, Group Five (Credit Policy Committee), "Want to Sell Your Bank?" Interstate Banking in 1987 and Beyond," Credit Policy Conference, Radford, VA, April 1987.

CONSULTING ACTIVITIES

Equity Valuation and Portfolio Management Consulting

Equity valuation modeling and portfolio optimization.

Cost of Capital Analysis and Financial Damages Estimation Consulting

Expert witness consulting and testifying (especially for U.S. telecommunications firms), economic damages analysis, and valuation of private firms. See testimony filings below.

Investment Education Consulting

Train investment professionals preparing for CFA examinations in the U.S., Europe, and Asia.

Selected Consulting Clients

Bell Atlantic

BellSouth Telecommunications

CFA Institute (formerly the Association for Investment Management and Research)

The Financial Analysts' Review of the United States

Howrey Simon Arnold & White, LLP

Institut Penembangan Analisis Finansial, Jakarta, Indonesia

LECG
Mubadala Development, Abu Dhabi, UAE

Schweser Study Program (a Kaplan Professional Company)

Securities Analysts' Association, Bangkok, Thailand

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Appendix C-Attachment 2

Nature and Applicability of Discounter Cash Flow Model in Cost of Equity Capital Analysis

NATURE AND APPLICABILITY OF THE DISCOUNTED CASH FLOW MODEL IN COST OF EQUITY CAPITAL ANALYSIS

I. Nature of the Discounted Cash Flow (DCF) Model

The DCF model is a formal statement of common sense and basic financial theory. The model asks an investor's most basic question: How much is this stock worth? Common sense dictates that the answer depends on what investors expect to get out of the stock and when they expect to get it. The "what" is the expected cash flow stream generated by the stock and the "when" is the projected timing of those expected cash flows.

Determining how much a stock is worth depends on one more critical consideration: the riskiness or probability that investors associate with their forecast of what they will receive from the stock. In this context, risk is the possibility that investors' expectations will be frustrated. Thus, risk is reflected by the probability that investors' actual returns will differ from their expected returns. The DCF model assumes that the average investor dislikes risk and consequently will accept higher risk only if there is a higher expected return.

The DCF model recognizes two types of expected cash flows: the periodic payment of cash dividends and the (possible) future sale of the stock. If an investor facing an opportunity cost of K percent expects to get dividends D_t annually for the next N years and then sells the stock at the end of year N for a price of P_N, then the appropriate current price P_0 is:

$$P_0 = \frac{D_1}{(1+K)^1} + \frac{D_2}{(1+K)^2} + ... + \frac{D_N + P_N}{(1+K)^N}$$

In summary, the appropriate price of a stock is the present value of all of the cash benefits that an investor expects to get from owning it.

II. Applicable Form of the DCF Model

A. Issues

The above form of the DCF model is typically modified in at least two ways in regulatory proceedings. First, a regulatory commission is presumably not concerned with determining how much a stock should sell for. Its goal is to determine what rate of return a firm's equity investors should reasonably expect to receive for bearing the firm's risk. Thus, a regulator is concerned with what the price is rather than with what it should be. The actual price P_{mkt} should consequently be used to infer investors' required rate of return.

Second, the form of the DCF presented above makes no explicit assumption concerning the expected rate of growth in dividends and the stock's price over time, nor any assumption concerning the length of an investor's expected holding period. However, the so-called constant growth form of the DCF model implicitly assumes that dividends and price grow at a constant rate G over time, that the growth rate is less than the required rate of return, and that investors have an infinite or indefinite holding period.

It is important to remember that the fundamental source of a stock's value to investors in the DCF model is its expected dividend stream. Why would investors be willing to trade a stock if the stock was nothing more than a piece of paper that would never pay any money? If the current price of a stock is the present value of all expected future cash flows, then the price at any point in time should be the present value of the expected cash flows beyond that point in time.

While an infinite holding period may not seem to apply to any one investor, this assumption is an accurate way of portraying the behavior of investors collectively. This is because investors must determine all prices, present and future, by projecting a seemingly endless series of future dividends. They must make such dividend projections since any expected future price is dependent on the dividends that are expected to be paid on that stock after it is purchased.

The constant growth form of the DCF model can be expressed as:

$$K = \frac{D_0\ (1 + G)}{P_{mkt}} + G = \frac{D_1}{P_{mkt}} + G,$$

where D_0 is the most recent dividend paid, G is the expected growth rate, D_1 is the next anticipated dividend, and the rest of the variables are defined as above.

Two additional modifications to the DCF model are often made. First, it should be recognized that dividends are paid by most companies on a quarterly, not an annual basis. The second common adjustment to the general DCF model presented above considers the flotation costs borne by the firm in raising equity funds. A flotation cost adjustment is not made in the current proceeding.

B. Adjustment for Quarterly Dividends

1. Rationale

The annual form of the DCF model assumes that investors receive dividends only once a year and that they have the opportunity to reinvest those cash flows in investments of the same risk. The required rate of return implied by the annual form of the DCF model will be biased downward if investors actually receive their dividend payments in quarterly rather than in annual installments. This bias results because equity investors have the opportunity to start earning a return on their reinvested dividends sooner when these dividends are received quarterly than when the dividends are received only annually.

Investors determine prices that are consistent with the returns that they expect to earn. Thus, investors pay prices that reflect that they expect dividends quarterly rather than annually. Failure to make this adjustment to the DCF model will understate the cost of equity capital. This adjustment should be made in order to determine an economically correct cost of equity for a regulated firm.

2. Specific Adjustment

There are two basic ways in which quarterly dividends can be handled. The first approach makes the simplifying assumption that dividends are paid quarterly and grow quarterly as well. While this approach has the virtue of simplicity, it is not realistic because most firms adjust their dividend payments only once a year, not quarterly.

The second approach assumes that firms pay dividends quarterly but that those dividends are only changed by a firm annually. Thus, quarterly reinvestment opportunities are recognized and the more realistic pattern of annual dividend growth is accounted for as well. This is the approach that I use in my analysis of a regulated firm's cost of equity. Further, I assume that firms on average adjust the level of their dividends in the middle of the year.

The adjusted DCF model calculates a revised dividend, D_1^q:

$$D_1^q = d_1 (1 + K)^{.75} + d_2 (1 + K)^{.5} + d_3 (1 + K)^{.25} + d_4,$$

where d_1 and d_2 are the two quarterly dividends paid prior to the assumed yearly change in dividends and d_3 and d_4 are the two quarterly dividends paid after the given change in the amount paid by a firm. This dividend, D_1^q, revised to recognize the quarterly payment of dividends that grow at rate G once a year (on average for all firms in the middle of the next 12 months), is substituted in the place of D_1 in the basic form of the DCF model as follows:

$$K = \frac{D_1^q}{P_{mkt}} + G.$$

In my analysis, the market price is the average of the monthly closing stock prices for the most recent three months for which data are available, which are September, October, and November of 2011.

C. Estimation of Growth for Use in the DCF Model

Investors are forward-looking. Investment decisions are made on the basis of how investors expect a stock to perform in the future. While how a stock has performed in the past may well influence an investor's expectations concerning future performance, there is no guarantee that the future will be a simple extension of the past. Thus, it is important that the estimated growth rate used in the DCF model be a prospective or expected, not a historical, rate.

Financial research indicates that the consensus growth rate forecasts of financial analysts are the most unbiased, objective, and accurate measure of investors' growth expectations

for a stock. Thus, I use the growth rate estimates published by Zacks Investment Research, Inc. (Zacks) and Value Line. Both Zacks and Value Line are used widely within the investment profession and are revised frequently enough to remain relevant to investors evaluating the growth prospects of stocks.

Appendix C-Attachment 3

Comparable Firm Identification Criteria and Methodology

COMPARABLE FIRM IDENTIFICATION CRITERIA AND METHODOLOGY

I. Introduction

The average rural local exchange company (RLEC) does not have publicly-traded equity. Consequently, there is no direct equity market evidence with which to directly measure the company's equity costs. Thus, it is necessary to identify a portfolio of firms that is comparable in equity investment risk to the target firm, which is the average RLEC. The discounted cash flow (DCF) model is applied to the portfolio's members and an average cost of equity capital is determined for the RLEC-comparables group. Given that this portfolio of firms is of comparable risk to the average RLEC, this average cost of equity is an objective, reasonable estimate of the average RLEC's cost of equity. The next section identifies the sources of investment risk and the specific proxies used to identify comparable firms.

II. Risk Criteria

The following sources of investment risk are measured and used to identify a group of firms that is comparable in risk to the average RLEC target under analysis:

A. Financial Risk

1. Relative Amount of Debt

Financial risk is dependent, in part, on the amount of total debt employed by a firm relative to its equity base. Other things being equal, higher debt per dollar of equity

implies higher risk. This source of risk is measured by a firm's equity-to-total capital ratio. The most recent annual value (2010) of this ratio is used.

2. Ability to Service Debt

Apart from the above descriptive measure of a firm's relative indebtedness, it is important to evaluate the ability of a firm to service its total debt. This is assessed by examining the amount of interest (I) that a firm owes relative to the resources (operating cash flow (OCF)) it has available to meet that commitment. This is measured by the cash flow-based interest coverage ratio, OCF/I. Other things being equal, an increase in this ratio reflects greater ability to service debt and consequently implies lower riskiness. The most recent annual value (2010) of this variable is used.

B. Business Risk

1. Variability of Cash Flows

The variability of a firm's cash flows characterizes the riskiness of a firm's chosen line of business. Cash flows represent a firm's command over goods and services. The risk implications of a given level of cash flows are easiest to interpret when related to an economically meaningful base such as total assets. This source of risk is measured by the standard deviation of the ratio of a firm's operating cash flows-to-total assets. Higher values of the measure are associated with greater risk. The variable is calculated using the most recent three years of annual data (2008-2010).

2. Operating Return on Assets

The operating return on assets, as measured by the ratio of a firm's operating cash flow-to-total assets, reflects the business risk associated with generating income in a given line of business. Operating cash flow is used because it does not include the risk effects captured in measures that include financing and investing choices. This variable is calculated using the most recent annual data (2010).

C. Relationship Among Regulatory, Business, and Financial Risk

RLECs face significant regulatory risk. While this risk is important, it is cannot be measured directly. However, it is reasonable to expect that the above business and financial risk measures capture the effects of regulatory risk. In other words, business and financial risk measurements should be influenced by the regulatory environment faced by a firm. Because the business and financial risk characteristics of the average RLEC reflect its regulatory environment, the resulting sample of companies comparable in risk to the average RLEC captures its business, financial, and regulatory risk. Indeed, the influence of regulatory risk on business and financial risk measures allows the comparable risk sample to be drawn from the broadest possible sample of firms irrespective of their particular industry or regulatory environment. In other words, it is not necessary to limit the potential sample of companies that are comparable in risk to the average RLEC to regulated telecommunications firms because the influence of the regulatory environment is already captured in the business and financial risk measurements. Investors compare companies on the basis of expected return

and risk across industry classifications and regulatory environments in making day-to-day investment decisions. Thus, the process used in the current analysis to identify a group of firms that are comparable in risk to the average RLEC relies on the common-sense logic used by investors in comparing firms.

III. Methodology Used in the Comparable Firms Identification Process

A portfolio of comparable firms is identified using a modified cluster analysis model. Classical cluster analysis techniques develop natural groupings of objects based on the relationships among a given set of descriptive variables. The goal is to determine how the object should be assigned to groups so that there will be as much similarity within groups and as much difference among groups as possible. No predetermined reference object is offered to organize the grouping effort. The modified cluster analysis used in this analysis differs from the classical techniques by identifying a target object (firm) characterized by several descriptive (financial) measures. The goal of this application is to find a group of firms that is as similar as possible to the target firm in terms of the identified measures of investment risk. Unlike classical cluster analysis, the goal of maximizing the differences among groups is irrelevant since all dissimilar groups are discarded. Specifically, in this context, only those firms that are identified as comparable to the given target firm are retained for use in inferring its cost of equity capital.

As in a classical cluster model, similarity is determined by measuring the Euclidian distance between the descriptive variables in a manner that considers the multivariate nature of the problem. The distance D_i of each firm i in the sample from the target firm T, using the four descriptive variables V_{ij} discussed above, is calculated as:

$$D_i = \sqrt{\sum_{j=1}^{4} (V_{ij} - V_{Tj})^2}.$$

The distance measure uses the squared differences of a given firm's descriptive variable from that of the target firm T in order to measure distance irrespective of whether it is above (positive) or below (negative) the respective value for the target firm. The portfolio of firms considered to be similar to the target, the average RLEC, is identified by balancing the goals of minimizing the distance D_i of a firm from the target with the desire to have a sample of sufficient size to assure confidence in its representativeness.

IV. Issues in Applying Cluster Analysis

Only firms available on the Zacks Investment Research data source *Research Wizard* also having a Zacks consensus growth rate forecast based on at least two analysts' estimates are retained for analysis. Firms must also have data available in *Value Line Investment Survey*. Foreign and limited partnership firms are eliminated. The sample of firms used to identify the average RLEC-comparable portfolio removes outliers on a variable-by-variable basis. Those firms with variable values greater than two standard deviations above or below the mean value of the population for

each variable are deleted. All outliers are eliminated before standardizing the variables to prevent biasing the means and standard deviations.

Because the proxies of investment risk discussed above are denominated in different units of measurement, they consequently need to be standardized. A Z-statistic is calculated using the mean of V_j and the standard deviation σ_j of each variable across all of the firms as:

$$Z_{ij} = \frac{V_{ij} - \overline{V_{ij}}}{\sigma_j}$$

The squared difference between the Z-value for each firm's given variable and the value of the Z-statistic for the target firm for the same given variable across all descriptive variables is then calculated. After generating Z-values for every variable for each firm, squared differences for each firm are summed. The distance measure D_i is determined by taking the square root of the sum of the squared differences.

The final step in the analysis is the identification of the portfolio of the 20 firms that are the least distance from the average RLEC target. Billingsley Exhibit No. RSB-4 lists the final group of comparable firms for the average RLEC. A correlation coefficient matrix for the variables used to identify firms is provided on the following page.

CLUSTER ANALYSIS CORRELATION MATRIX

	Cash Flow Interest Coverage	Operating Cash Flow/ Assets	Operating Cash Flow/Assets Standard Deviation
Common Equity/ Total Capital	0.1741	0.0876	0.1569
Cash Flow Interest Coverage		0.4773	-0.1688
Operating Cash Flow/Assets			0.0034

Appendix C-Attachment 4

Discounted Cash Flow Costs of Equity and Betas for the Average RLEC Comparable Firm Portfolio

DISCOUNTED CASH FLOW COSTS OF EQUITY AND BETAS FOR THE AVERAGE RLEC COMPARABLE FIRM PORTFOLIO

Portfolio of Comparable Firms	Cost of Equity	Value Line Beta
3M Company	16.57%	0.80
Abbott Labs	11.50%	0.60
Advance Auto Pt.	15.42%	0.85
Albemarle Corporation	13.76%	1.30
Autoliv, Inc.	7.04%	1.30
Bard C R, Inc.	11.43%	0.60
Baxter International	12.89%	0.70
Church & Dwight	11.77%	0.60
Coca Cola Company	11.83%	0.60
Cooper Industries, Plc.	15.36%	1.20
Dentsply International	11.64%	0.90
Ecolab, Inc.	14.34%	0.80
Flowers Foods	9.30%	0.50
Flowserve Corporation	15.20%	1.50
Genl Dynamics	10.84%	1.00
Idex Corporation	16.89%	1.15
Johnson & Johnson	9.50%	0.65
Raytheon Company	11.32%	0.75
Sigma Aldrich	11.09%	1.00
V F Corporation	13.27%	0.95
AVERAGE	**12.55%**	**0.89**

Appendix C-Attachment 5

Capital Structure of Portfolio of Companies Comparable in Risk to the Average RLEC

Capital Structure of Portfolio of Companies Comparable in Risk to the Average RLEC

November 2011[1]

COMPANY	MARKET VALUE OF COMMON EQUITY ($M)	BOOK VALUE OF TOTAL DEBT ($M)	DEBT / TOTAL CAPITAL	EQUITY / TOTAL CAPITAL
3M Company	54,164.02	10,272	0.15941	0.84059
Abbott Labs	82,854.19	29,786	0.26443	0.73557
Advance Auto Pt.	4,646.22	2,149	0.31625	0.68375
Albemarle Corporation	4,385.34	1,216	0.21709	0.78291
Autoliv Incorporated	4,748.21	2,473	0.34246	0.65754
Bard C R Incorporated	7,453.71	1,295	0.14802	0.85198
Baxter International	30,595.5	8,404	0.21549	0.78451
Church & Dwight	6,324.20	697	0.09927	0.90073
Coca Cola Company	15,3769.80	32,549	0.17470	0.82530
Cooper Industries, Plc.	8,121.60	2,446	0.23146	0.76854
Dentsply International	4,896.09	964	0.16450	0.83550
Ecolab Incorporated	15,997.30	1,981	0.11019	0.88981
Flowers Foods	2,693.10	342	0.11268	0.88732
Flowserve Corporation	4,990.40	1,932	0.27909	0.72091
Genl Dynamics	22,214.10	13,607	0.37986	0.62014
Idex Corporation	2,866.70	762	0.20999	0.79001
Johnson & Johnson	175,502.63	32,228	0.15514	0.84486
Raytheon Company	15,070.35	9,570	0.38839	0.61161
Sigma Aldrich	7,711.37	830	0.09717	0.90283
V F Corporation	14,656.90	2,045	0.12244	0.87756
AVERAGE	**$31,183.10**	**$7,777.4**	**0.20940**	**0.79059**

[1] Based on the closing common stock prices for the month of November, 2011, and 2010 financial statements. Note that none of the comparable companies had preferred stock outstanding.

Appendix D

The Commission's Proposed Use of Quantile Models to Limit Recovery of Capital and Operations Expenses from the Federal High-Cost Universal Service Fund

Rural Association Analysis

The Commission's Proposed Use of Quantile Models to Limit Recovery of Capital and Operations Expenses from the Federal High-Cost Universal Service Fund

Rural Association Analysis

Executive Summary

This paper analyzes several aspects of the quantile regression models adopted by the FCC in its November 18, 2011 ICC/USF Reform Order.[1] Significant concerns have already been raised regarding the Commission's decision to adopt such models without adequate study.[2] As shown herein, the modeling approach adopted by the Commission suffers from a number of additional flaws which will cause arbitrary reductions in support levels for rural rate-of-return local exchange carriers (RLECs), and in some cases produce results that run directly contrary to the Commission's stated goals. These additional flaws include:

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[1] *Connect America Fund,* WC Docket No. 10-90, *A National Broadband Plan for Our Future,* GN Docket No. 09-51, *Establishing Just and Reasonable Rates for Local Exchange Carriers,* WC Docket No. 07-135, *High-Cost Universal Service Support,* WC Docket No. 05-337, *Developing an Unified Intercarrier Compensation Regime,* CC Docket No. 01-92, *Federal-State Joint Board on Universal Service,* CC Docket No. 96-45, *Lifeline and Link-Up*, WC Docket No. 03-109, *Universal Service – Mobility Fund,* WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, FCC 11-161 (rel. Nov. 18, 2011) ¶ 210 (*Order* or *FNPRM*).

[2] *See, e.g.,* Petition for Reconsideration and Clarification of NECA, OPASTCO and WTA, WC Docket No. 10-90, *et al*. (filed Dec. 29, 2011) (*December 29 Petition for Reconsideration*). NECA, OPASTCO and WTA objected to the Commission's decision to apply such caps retroactively to investments made prior to the effective date of the Commission's implementing rules, and its decision to update the caps each year based upon refreshed "runs" of the regression analyses, as this adds significant unpredictability to support flows. In a separate petition for reconsideration, Accipiter Communications showed the Commission's regression caps irrationally fail to distinguish between circumstances where relatively high costs are legitimately incurred and circumstances involving waste, fraud, abuse or other inefficiencies. Accipiter also demonstrates the data and independent variables used as inputs to the model are flawed, and don't provide companies with sufficient notice regarding long-term financial effects. Petition for Reconsideration and Clarification by Accipiter, WC Docket No. 10-90, *et al*. (filed Dec. 29, 2011). *See also* Letter from Caressa D. Bennet, Bennet & Bennet, PLLC (on behalf of Central West Texas telephone Cooperative), to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al*. (filed Jan. 9, 2012) (expressing concern the FCC's models do not take several critical factors such as loop length and unusual terrain conditions into account, and don't produce consistent results for similarly-situated companies); Letter from Stephen G. Kraskin, Communications Advisory Counsel, LLC (on behalf of the Rural Broadband Alliance and RICA), to Marlene H. Dortch, FCC, WC Docket No. 10-90, *et al*. (filed Jan. 9, 2012) (regression model does not accurately reflect company-specific considerations or correctly identify high-cost companies).

1. Poor mapping of study area boundaries
2. Poor mapping of census blocks to study areas
3. Flaws in use of accounting data
4. Irrational application of limits separately to each account
5. Lack of statistical significance of most variables

Effects of these flaws are substantial, with some companies experiencing significant reductions in support without regard to whether their capital or operational expenditures can reasonably be considered excessive. These flaws in some cases are inherent in the structure of the proposed models – they cannot be resolved by making changes in the *Further Notice* phase of this proceeding. In other cases, changes to the Commission's approach may reduce the extent to which companies experience arbitrary or counterproductive results, but would not resolve all identified problems with the models and may, in some cases, entail imposing substantial administrative burdens on the Commission and affected companies. The Commission should accordingly not adopt a regression-based approach for limiting capital or operating expenditures, but should instead adopt more reasonable methods, such as those proposed by the Rural Associations in earlier phases of this proceeding.[3]

Description of Limitation Mechanism

The *Further Notice* proposes limits on certain costs that could be included in calculation of universal service support. The *Further Notice* proposes using quantile regression models to estimate 90th percentile limits on several cost components of data reported by cost companies for current universal service high cost loop support.[4] The Commission's method limits a component reported by a company if the actual cost exceeds the 90th percentile estimated by the model for that component.[5] The second step of the Commission's method adds together the cost components, which reflect these limits, to calculate an adjusted cost per loop for each study area.

Following release of the *Order* and *Further Notice* the Commission released a set of data including all the variables used in its quantile regression models. The Commission's models are based on 2010 demographic data from the U.S. Census, 2010 census block boundaries, 2010 ILEC boundary data available from Tele Atlas[6], and the NECA 2011-1 High Cost Loop data submission.

For purposes of this analysis, models were produced for each of the cost components that precisely replicate the Commission's models. These models were then used to perform the analyses described below.

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[3] *See* Comments of NECA, NTCA, OPASTCO, and WTA, WC Docket No. 10-90, *et al*. (filed April 18, 2011) (*Rural Associations April 18 Comments*).

[4] *Further Notice* ¶ 1080.

[5] *Id*. *See also* Appendix H ¶¶ 4-5, 11-12.

[6] *Notice Concerning Universal Service-Intercarrier Compensation Transformation Proceeding*, WC Docket No. 10-90, *et al*., Public Notice, DA 11-1966 (rel. Dec. 2, 2011).

A. Geographical Mapping Data Underlying the Models are Substantially Inaccurate

RLEC cost data used in the Commission's models is reported for telephone company operating service areas, called study areas. To assign census data to study areas, the Commission uses geographical software to map census block boundaries to estimated study area boundaries. These ILEC serving area boundary data depends on several imputations. First, boundaries of areas served by each wire center deployed by each ILEC were estimated. This process started with a database (NECA's Tariff 4 database used by FCC) which records geographical coordinates of actual locations ("geocodes") of wire centers deployed by exchange carriers. Using another database of geocoded street addresses, telephone company customers were assigned to nearby wire centers. Each wire center serving area boundary was next estimated by interpolating between locations of those customers assigned to it and those customers not assigned to it.[7]

Thus, the mapping process generally assigns customers to wire centers based on proximity, rather than on the design of the local network in place. This creates the first source of inaccuracy in the boundary data. Exhibit 1 summarizes the scope of such inaccuracies. In addition, inaccuracies result because each customer's street address is not always the location where the customer receives telephone service.

Next, wire centers were associated with study areas based on the identification of the carrier serving the study area and the identification of the carrier owning the wire center. In most cases this association is exact, but not always.[8]

Third, boundaries of wire centers assigned to a study area were aggregated to create a composite boundary of the study area. This step incorporates whatever inaccuracies were embedded in the preceding steps.

Exhibit 1 compares areas of 357 study areas in the Tele Atlas database to the areas of actual study area boundaries recorded by NECA in a recent study.[9] NECA's boundaries were taken from exchange boundary maps on file with state public utility commissions. This exhibit shows that many of the Tele Atlas boundaries differ quite significantly from actual boundaries.[10] Of 357 study areas for which NECA has the actual boundaries, 144 are not accurate within 5%, and 80 are not even accurate within 20%. A significant number differ by more than 50%, and a few are completely (i.e., 100%) inaccurate.

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[7] *Further Notice* ¶ 1081; Appendix H ¶ 21.

[8] For example, a few study areas are owned jointly by more than one telephone company, in which cases the map from wire center to study area is not one-to-one.

[9] *See* Joint Comments of OPASTCO, NECA, NTCA, and WTA, WC Docket No. 10-90, GN Docket No. 09-51, WC Docket No. 05-337, Attach. at 1-3 (filed July 12, 2010).

[10] Significant inaccuracies of vendor-developed boundaries underlying these ILEC boundaries were documented by the Associations in their comments on the National Broadband Plan. *Id.*

Exhibit 1
Errors in Tele Atlas Boundary Square Miles

Error % of Actual	Study Areas	% of Study Areas
Within 1%	33	9.2%
1% to 2%	33	9.2%
2% to 5%	76	21.3%
5% to 10%	71	19.9%
10% to 20%	55	15.4%
20% to 50%	52	14.6%
50% to 100%	28	7.8%
More than 100%	9	2.5%
Total Compared	357	100.0%

Resolving these inaccuracies would require substantial effort. Verifiable studies of documented serving areas of all RLECs would need to be completed to assure that calculations are correct. These studies would involve obtaining maps of study area boundaries for each RLEC, which would need to be digitized to create a workable database of actual study area boundaries.

The Commission's process next associated census blocks with these estimated study area boundaries.[11] Mapping software generally associates two shapes by finding that a point inside the boundary of the first shape is also inside the boundary of the second shape. Thus, the process would find a "centroid" of a census block shape and search study area boundaries to find the one that included the centroid. Replication of this process for all census blocks completes the assignment of census blocks to study areas.

This process of associating census blocks to study areas generates significant inaccuracy, as illustrated by actual examples in Exhibits 2A, B and C. Exhibit 2A first shows a successful match. The outermost dashed boundary line of the shapes in this exhibit is the study area boundary recorded in the Tele Atlas database. The smaller boundaries shown in the exhibit are boundaries of census blocks. Inspection of this exhibit shows two attributes. First, the boundaries of the census blocks entirely fill the Tele Atlas boundary. Second, none of the census block boundaries extend outside the Tele Atlas boundary. These two attributes are necessary for an accurate match between the two types of boundaries.

[11] Appendix H ¶ 21.

Exhibit 2A
Census Block Assignment Errors in Mapping Process
Census Blocks Correctly Mapped to a Study Area

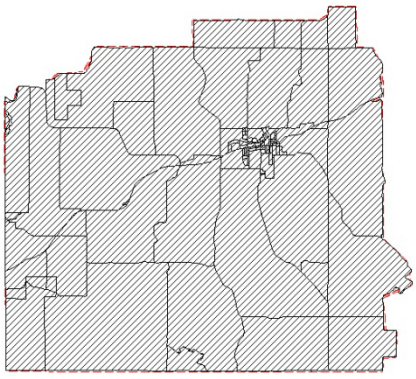


Exhibit 2B shows a second example, in which none of the census block boundaries extend outside the Tele Atlas boundary (attribute 2 success), but the census blocks do not completely fill the Tele Atlas boundary (attribute 1 error). This exhibit illustrates under-measurement inaccuracy in the mapping.

Exhibit 2B
Census Block Assignment Errors in Mapping Process
Census Blocks Under-Measure a Study Area

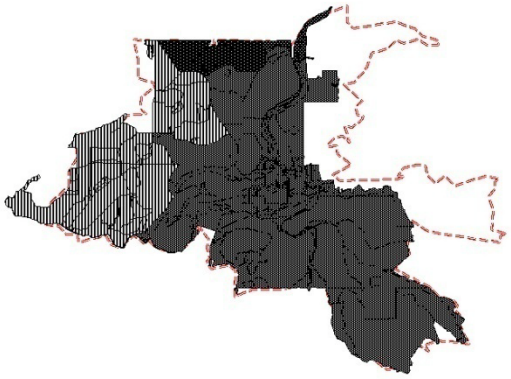
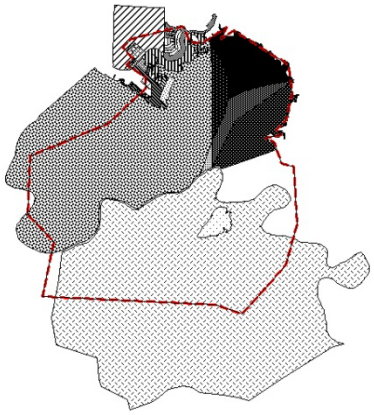


Exhibit 2C shows a third example, in which portions of the Tele Atlas boundary are not filled by census blocks (attribute 1 error) and some census block boundaries extend outside the Tele Atlas boundary (attribute 2 error). This example illustrates both over-measurement and under-measurement errors.

Exhibit 2C
Census Block Assignment Errors in Mapping Process
Census Blocks Under and Over-Measure a Study Area



It is worth noting that both exhibits 2B and 2C show significant measurement errors. The space occupied by each census block is not so granular as to make such errors inconsequential. Furthermore, the areas of rural census blocks tend to be larger than areas of more urban census blocks. Consequently, the proportionate measurement error can be expected to be larger in more rural areas.

It is important to note in these examples that the demographic data used in the Commission's model is the data belonging not to the study area, but to the area enclosed by census blocks associated with the study area by the Commission's mapping process. Thus, both the study area boundary errors and the census block mapping errors contribute to incorrect data in the Commission's quantile regression model.

The following exhibit shows the importance of resolving accurate mapping of boundaries. In the first part of the exhibit are data of 375 study areas which map poorly between Tele Atlas and census blocks. Nearly all variable correlations in this exhibit are lower than 15%, quite low for purposes of statistical modeling. In contrast, the lower half of the exhibit shows correlations for 345 study areas whose data maps well. Correlations among this group range from two to six times higher than among the first group. Such dramatic differences in correlations show that not only are the models weak based on current data accuracy, but they have a high expectation of estimating incorrect quantities.

Exhibit 3
Effects of Mapping Errors on Data Correlations

375 Study Areas with Differences between Tele Atlas and Census Block Boundaries Over 2%

	Housing Units			Land Area			Census Blocks		
Data Line	Non Urban	Urban Area	Urban Cluster	Non Urban	Urban Area	Urban Cluster	Non Urban	Urban Area	Urban Cluster
AL1	14%	-2%	3%	10%	0%	3%	29%	-2%	2%
AL2	14%	-2%	2%	9%	0%	3%	24%	-2%	2%
AL7	10%	-1%	1%	10%	-1%	2%	25%	-1%	1%
AL8	11%	-2%	1%	10%	-1%	1%	24%	-1%	1%
AL13	15%	1%	5%	15%	2%	5%	26%	1%	5%
AL14	11%	0%	4%	18%	1%	5%	22%	0%	4%
AL15	11%	-1%	7%	5%	0%	7%	16%	-1%	5%
AL16	14%	2%	11%	12%	3%	10%	16%	2%	7%
AL17	15%	-1%	2%	7%	1%	2%	26%	-1%	2%
AL18	14%	-1%	2%	6%	1%	2%	22%	-1%	1%
AL21	14%	-1%	2%	13%	1%	2%	25%	0%	2%

345 Study Areas with Differences between Tele Atlas and Census Block Boundaries Under 2%

	Housing Units			Land Area			Census Blocks		
Data Line	Non Urban	Urban Area	Urban Cluster	Non Urban	Urban Area	Urban Cluster	Non Urban	Urban Area	Urban Cluster
AL2	61%	55%	42%	44%	58%	39%	40%	56%	40%
AL7	76%	38%	38%	41%	47%	34%	45%	39%	37%
AL8	56%	36%	39%	46%	48%	35%	35%	39%	35%
AL13	74%	26%	45%	40%	35%	40%	59%	30%	47%
AL14	57%	22%	35%	38%	33%	31%	40%	25%	37%
AL15	64%	45%	40%	34%	48%	34%	50%	46%	40%
AL16	68%	40%	44%	33%	43%	41%	49%	41%	50%
AL17	81%	51%	36%	35%	52%	33%	47%	50%	39%
AL18	58%	48%	33%	41%	53%	30%	37%	49%	31%
AL21	78%	36%	50%	52%	37%	44%	55%	37%	50%

If the Commission determines that use of demographic census data in models is necessary, it should establish a sensitivity threshold for accuracy of mapping between census blocks and study areas. Whenever the area of census blocks mapped to a study area differs by more than this threshold, or at the initiative of the LEC, a detailed analysis of census blocks mapped to a study area should be used to resolve differences.

Resolution of differences should consider the proportion of area within a census block that is also within the study area, and the location of population concentrations in the census block relative to the study area boundary. In many cases resolution could require counting of households by geographic coordinates, and using these household counts to apportion census data to subsections of census blocks. It would be necessary to complete this analysis for every census block that does not map reasonably completely to a single study area. The Commission should not implement models relying on census data without undertaking this effort.

The Commission should clarify the administrative reporting requirements and application of support adjustments for any corrections. Indeed, if the Commission determines it necessary use census data in statistical models, and moves to resolve current data inaccuracies to serve this purpose, a clearly defined path to implementation is critical. The Commission must clarify what data sources and mapping methods will be used in the future, and stipulate the standards, responsibilities and administration for these processes. Adopting one basis of models now as an intermediate step, followed by methods changes in later years with serious impacts, would whipsaw companies' financial planning, undermining the provision of universal service.

B. The Commission's Use of Statistical Estimates of Data Variances as a Limiting Rule does not Support the Stated Purpose of the Model.

According to the *Order*, the stated purpose for the models is to ensure that companies "do not receive more support than is necessary to serve their communities."[12] Cost data used to develop the Commission's models, and to which the Commission applies the limits estimated by the models, is taken from the Universal Service Fund High Cost Loop Data Submission provided as the initial basis of 2012 high cost loop support by RLECs.[13] This data was filed with the Commission on September 30, 2011, and is the first of four quarterly updates allowed under current rules (hence the name for this data is the 2011-1 Data Submission).[14] This data represents investment and expenses for the year ending December 2010. Commission rules allow

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[12] *Order* ¶ 210.

[13] *See* Universal Service Fund 2011 Submission of 2010 Study Results by the National Exchange Carrier Association, Inc. (filed Sept. 30, 2011).

[14] Considering the cycles of reporting of cost data, and timing of payments, if the Commission adopts limitation models in its rules, it must clarify in its rules which reporting periods its annual limitation models will be based on, and what support payment period is covered by those models. It would be reasonable to base limitation models on the same data reports to which those limitations would apply. These designations would be complicated by the difference in reporting cycles and accounting periods reflected in high cost loop support and interstate common line support, as discussed in Section H below. Also, tying models to an instant data submission would necessitate a close tie between data submission and model development responsibilities, as high cost loop support payments take effect three months after initial data is filed with the FCC, and common line revenue requirements underlying ICLS payments commonly take effect in tariffs on fifteen days notice after being filed.

quarterly updates of this data in December 2011, and in March and June of 2012.[15] Such actual embedded cost data is the correct basis of universal service support calculations.

Each of the Commission's quantile models analyzes cost data in an account reported for the purpose of high cost loop support by exchange carriers. As such, each quantile model serves the purpose of isolating study areas whose accounts exceed the 90th percentile of costs relative to a trend-line measured by the model. For the purpose of calculating universal service funding, the Commission proposes to cap the account of such a carrier at the 90th percentile level. By this method, the Commission proposes to use statistical estimates of data variance as a limiting rule for costs eligible for compensation from the universal service fund.

While a modeling approach that cuts support for companies exceeding the 90th percentile of costs may, in theory, be a rational method for limiting recovery of high costs, the Commission does not show a link between estimates provided by the models and the models' stated purpose. That is, there is no stated basis for concluding that costs exceeding the 90th percentile are excessive or not necessary for the purposes of providing service in a given community. Absent some justification as to why cost recovery must be limited to amounts below the 90th percentile, the Commission's use of quantile regression models in this manner appears inherently arbitrary.

C. Investment models are not CAPEX models; Depreciation Expense is not an operating expense.

The Commission's quantile regression models supposedly seek to limit recovery of capital and operating expenses by RLECs. The term "operating expenses" is typically used to designate costs such as salaries, payroll and property taxes, maintenance, vehicle and building service expenses, etc.[16] Depreciation expenses are normally not included in operating expenses, nor are costs of new fixed assets. Nevertheless, quantile models for algorithm lines 17 and 18 would directly limit depreciation expenses, without reference to any possible limits imposed on corresponding investment.

None of the proposed models are designed to limit capital expenditures. Rather, models for algorithm lines 1, 2, 7 and 8 aim at investment in embedded plant. This difference is important. A capital expense is an outlay for an asset in one year that will continue to provide value to the business in years to come. Such expenditure is booked to a capital (investment) account. Investment accounts, therefore, include the aggregation of all amounts of capital expenses incurred in this year and in any prior year for assets still in service. Thus, a capital expense is an amount spent this year, while embedded investments include amounts spent this year, and in all prior years. These are far from interchangeable quantities.

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[15] As the Associations explained in the *December 29 Petition for Reconsideration,* annual updates to the models has a significant potential to render support amounts inherently unpredictable, contrary to the Act's requirements. Providing quarterly updates to the models would much more seriously undermine predictability, and add significantly to the administrative burdens associated with the models.

[16] *Further Notice* ¶¶ 1079-1080, 1085-1086.

To illustrate, Exhibit 4 shows actual capital expense and investment data of two RLEC study areas. Study Area Y had low capital expense, while Study Area X had much higher capital expense. Nevertheless, Study Area Y has much higher investment than Study Area X due to prior investment patterns. Under the Commission's method, Study Area Y's recovery could be limited, while Study Area X may not. Thus, while some of the Commission's models purport to limit high capital expenses, they may in many cases have quite the opposite effect.

Exhibit 4
Actual Plant In Service and CAPEX Examples

	Study Area X	Study Area Y
CAPEX	1,693,701	795,111
Telephone Plant in Service	8,433,283	30,754,983

Even if the hidden purpose of the quantile models is to simply limit high investment amounts possibly contributing to unduly high universal service support, the models still fail. This failure occurs because the models aim at limiting gross investment, a quantity not used directly to calculate support. Rather, all regulated telephone cost recovery is based on allowable expenses and return on *net* investment, which is the difference between total (gross) investment and depreciation and amortization reserves. Exhibit 5 illustrates the calculation of return on investment.

Exhibit 5
Net Versus Gross Investment Illustration

		Study Area A	Study Area B
1.	Gross Investment	1,000,000	10,000,000
2.	Reserves	100,000	9,500,000
3.	Net Investment (Line 1 – Line 2)	900,000	500,000
4.	Return on Investment (11.25% of Line 3)	101,250	56,250

In this exhibit, Study Area A has less gross investment than Study Area B. Study Area A's investment is newer, however, as illustrated by the level of its reserves, which are only 10% of its gross investment. This indicates that the investment has only been in service and depreciated for one-tenth of its useful life. Reserves of Study Area B, in contrast, are 95% of gross investment, indicating that the investment has been in service and depreciated for nearly all of its useful life. Correspondingly, Study Area B would earn approximately one-half as much return on investment as Study Area A (line 4). This illustrates the condition that of two companies, the one with much higher gross investment may easily realize lower return on investment than one with lower gross investment. Because return on net investment is the only investment-driven component that affects universal service support, limiting gross investment instead of net investment misses the target of limiting support.

The Commission's models implement limits on investment in a doubly perverse way. First, the presence of a model for investment with no accompanying treatment of Accumulated Depreciation reserves, commits the same accounting practice violation noted above with regard

to depreciation expense; i.e., it de-links the accounting for the asset from the accounting for depreciation reserves.

Second, limiting investment without proportionately limiting reserves results in a double hit on return on investment, potentially producing negative return in many cases. Exhibit 6 illustrates this effect, assuming that the company's investment all starts as brand new in year 1 and has a lifetime of ten years, with no salvage value at its end.

Exhibit 6
Illustration of Negative Net Investment By A LEC

Year	A. Gross Investment	B. Depreciation Expense	C. Accumulated Depreciation	D. Net Investment (A – C)
1	100,000	10,000	10,000	90,000
2	100,000	10,000	20,000	80,000
3	100,000	10,000	30,000	70,000
4	100,000	10,000	40,000	60,000
5 Limited	40,000	10,000	50,000	-10,000

Exhibit 6 shows five consecutive years of depreciation expense accumulations causing net investment declines. In year 5 this exhibit shows the application of a method to limit gross investment, showing $40,000 instead of the initial $100,000. Because the Accumulated Depreciation account has not been linked to this limit, the balance in that column now exceeds the allowed gross investment amount. Column D shows the resulting nonsensical negative net investment in year 5. Return on investment will be negative, as it is the product of the rate of return and this negative net investment amount. Indeed, the Commission's models would limit gross investment for a company with high investment amounts, even if the investment were fully depreciated, causing net plant to be zero.

This exhibit illustrates that any method of limiting investment eligible for funding, either based on capital expense or on embedded plant, must treat accumulated depreciation precisely in parallel with investment.

A statistical model is not the best way to limit capital investment eligible for support. A better approach was proposed to the Commission by the Rural Associations in comments submitted in this proceeding on April 18, 2011. The Vantage Point proposal filed by the associations would limit expenses eligible for universal service funding without any of the improper effects created by statistical models, which are described in these comments.[17]

[17] *Rural Associations April 18 Comments,* Appendix A. In addition, the Vantage Point proposal avoids retroactive capping of investments made in years before this Order was released, by applying caps only to expenditures in the current year.

D. By limiting individual accounts of targeted study areas, the Commission's models produce irrational results.

The quantile regression model method presented by the Commission relies on the structure of data submitted under current rules for high cost loop universal service support. That data submission includes 58 separate data elements, which are combined into twenty-six "algorithm lines", which in turn are used to calculate a study area's loop cost. To calculate support, each study area's overall cost per loop is compared to a nationwide benchmark. Those exceeding 115% of the benchmark are eligible for support. A study area's level of support is increased based on how much its cost exceeds the benchmark.

Consequently, for purposes of high cost loop support, a study area has "low cost" if its cost per loop is less than 115% of the benchmark.

Algorithm line 19 contains the amount of Corporate Operations Expense includable in cost per loop. Since 1998 these costs have been subject to a limit determined by an "ordinary least squares" (OLS) regression model set forth in the Commission's rules. The rules proposed to take effect on July 1 would maintain the OLS model limits on this account. Accordingly, no quantile model has been presented by the Commission for use in limiting this account.

In addition, some algorithm lines are calculations based on other algorithm lines for which the Commission has presented quantile regression models in its *Further Notice*. Amounts in these algorithm lines are inherently limited by their dependency on other lines, and are therefore not subject to their own models under the Commission's proposed method.

This leaves eleven of the twenty-six algorithm lines, each subject to direct testing against limits prescribed by its own quantile regression model. For example, the quantile regression model for algorithm line 1 (Quantile Model 1) prescribes limits for Cable and Wire Facilities Investment in loop equipment, while Quantile Model 2 prescribes limits for Central Office Equipment investment in loop equipment. An analysis of the effects of quantile model limits shows that many study areas would have one algorithm line reduced by its limit, while other algorithm lines would not be reduced. This has the effect of reducing costs of many study areas whose overall loop costs are not among the highest. Indeed, even many low-cost study areas would experience reductions based on the quantile models.

Exhibits 7A and 7B are graphical displays of cost per loop data of RLEC cost company study areas. Exhibit 7A displays data of study areas not affected by any of the quantile models by small dots, while data of those affected by one or more models are displayed by diamond shapes. The diamonds are not found only in the higher cost ranges of cost data, but are widely scattered across the full range of data.

Exhibit 7A
Actual Cost per Loop Data before Limitation by the Commission's Models

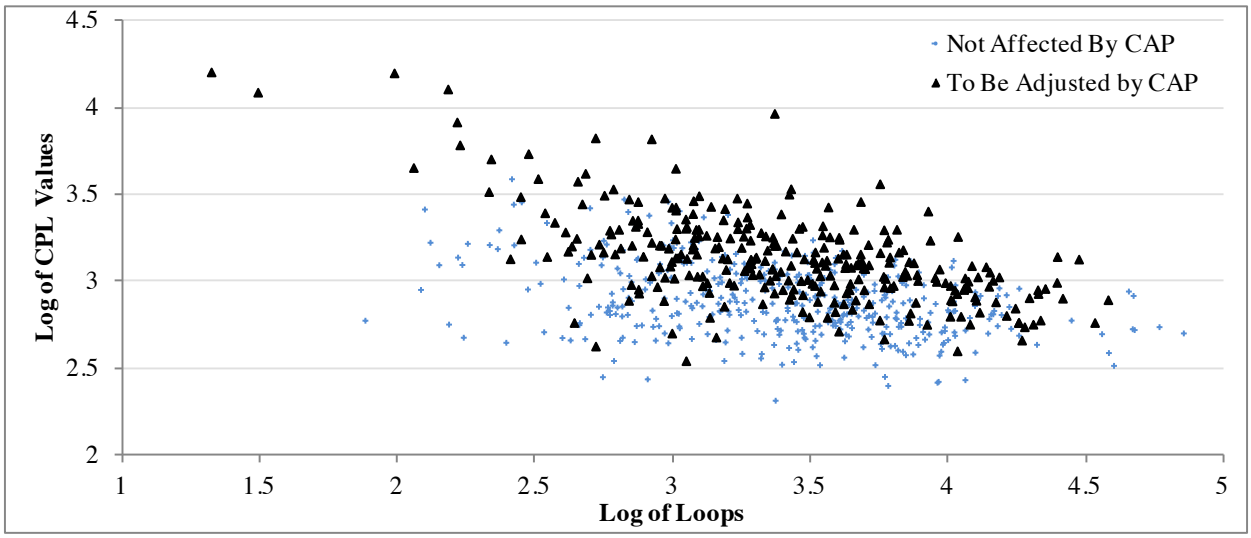
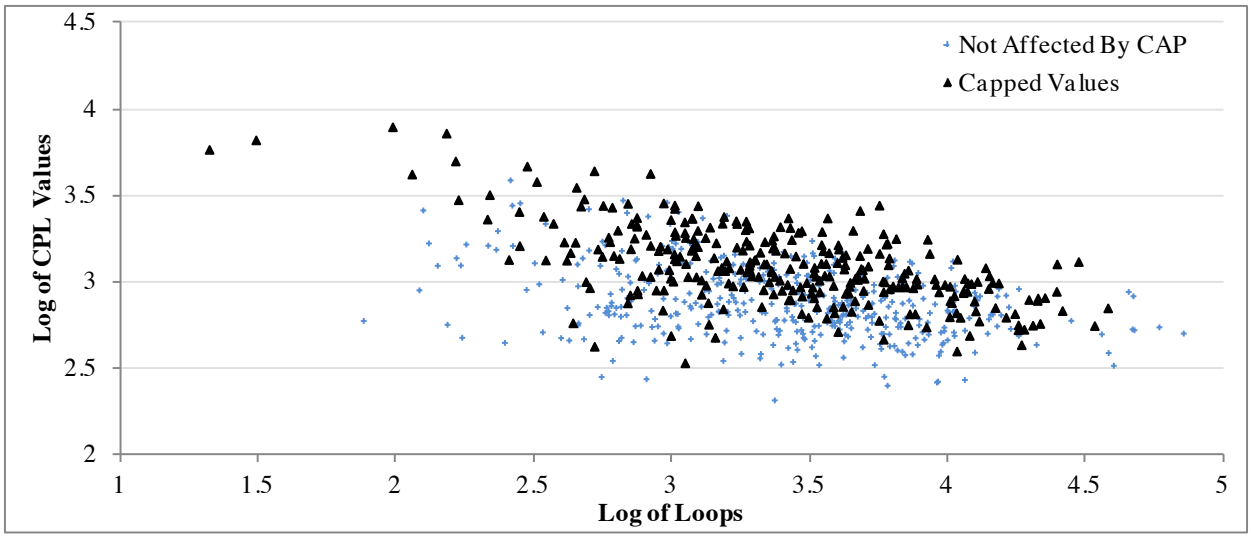


Exhibit 7B displays the same cost per loop data, but with the diamonds positioned to reflect the limits imposed by the quantile regression models. To be sure, every diamond in this exhibit is lower that its mate in Exhibit 7A. Study areas starting with high cost diamonds have diamonds somewhat lower, just as do study areas starting with low cost diamonds.

Exhibit 7B
Cost per Loop Data after Limitation by the Commission's Models



It is clear from this exhibit that, while the quantile regression models reduce costs to be included in support calculations, they do not systematically target any level of overall cost.

In today's fund, study areas having cost per loop exceeding $591.61 receive high cost loop support. On a logarithmic scale, this would appear on Exhibit 7A as a value on the vertical axis exceeding 2.77, or halfway between the axis labels at 2.5 and 3.0. By inspection, many of the black diamonds on that graph are below that line, indicating that before imposing the models these study areas did not have cost high enough to qualify for support.

Examples of companies that do not qualify for support, yet have costs reduced by the model are shown in the appendix as receiving zero payments but having limited costs in one or more accounts not equal to reported costs. Accounts limited for these carriers include Network Operations Expense, Network Support or General Support Expense, Depreciation of Cable and Wire Facilities, Maintenance of Cable and Wire Facilities or Central Office Equipment, Materials and Supplies, or Central Office Equipment investment. It is worth noting that in none of these cases was a limit imposed on Cable and Wire Facilities Investment, which is the largest account contributing to loop cost.

By limiting each account separately, without regard to needs of individual networks, the Commission's method discourages network optimization. Exchange carriers decide on incremental enhancements to their networks based on numerous considerations. Examples include geological factors such as terrain and soil, geographic factors such as customer locations, roadways and rights of way, existing network arrangement, condition and capacity, and customer demand. Characteristics, such as long loops, that push one carrier to rely more on central office equipment expansion, may occur side-by-side with characteristics of another carrier whose customer demand requires higher capacity over shorter distances, favoring upgrade of cable facilities. Similarly, a carrier with aged plant in need of replacement may economically replace existing copper cable with fiber cable, resulting in higher cable costs accompanied by lower depreciation and maintenance costs. Yet a neighbor with comparatively newer copper plant may find it necessary to carry the equipment in service on its books, upgrading its transmission quality and capacity with new electronics supported by higher maintenance costs.

These concerns are not hypothetical. Real-life network conditions compel such choices. Subjecting carriers facing these choices to limitations by account will in many cases produce exactly the opposite outcomes of those intended by limiting accounts. Instead of spending efficiently in accounts that would not qualify for support, the Commission's methods would reward companies who make less efficient expenditures, or providing lesser service capabilities.

Study areas with sequence numbers 29 and 32 in Appendix 1 illustrate the effects of limitations by account. The first would be limited based on its level of Central Office Equipment, while the latter would be limited based on its Cable and Wire Facilities. Yet the two carriers have nearly identical total investment per loop, and both carriers have less investment than study area 41, who is subject to limits in neither account.

The Commission's decision to adopt quantile models for limit recovery of capital and operating was based in part on the work of Roger Koenker and Gilbert Basset, who explained how quantile

regression models can overcome errors commonly associated with ordinary least squares models.[18]

Following issuance of the *Order and Further Notice,* the Associations contacted Dr. Koenker and him to review the Commission's proposed use of quantile models to assess capital and operational expenditures in individual accounts. As Dr. Koenker explains in his statement, Appendix E, there are theoretically two conditions that render invalid applying limits based on separate quantile regression models for each account.[19] These conditions occur whenever values in two accounts are interdependent, and one or both of these accounts is limited by a model. Such substitution interdependence occurs between Cable and Wire Facilities and Central Office Equipment investment. Complementarity interdependence occurs between investment and accumulated depreciation. Dr. Koenker concludes that the Commission's application of its quantile models does not resolve such interactions. Dr. Koenker explains that conditional quantile models (a regression method in which values assigned by one model depend on values assigned by another model) would be needed to resolve interdependencies.[20]

E. Demographic variables used in the Commission's models sometimes introduce unacceptable arbitrariness.

The Commission's models relate dependent variables (algorithm line costs per loop) to independent variables (loop counts and census data). Independent variables used in the models include housing units, land area, and census block counts, separately for non-urban, urban and urban cluster areas; and loop counts and percent water by study area.[21]

Of these, the Commission's t-statistics show that only one variable (loops) is statistically significant in all models. Other variables are significant in some but not all models. Nevertheless, the Commission has included all variables in all models. This is not a valid strategy. Independent variables should only be included in a model if they contribute to the model with statistical significance. The Commission should not include an independent variable that lacks significance in one model just because it has significance in a different model.[22]

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[18] Appendix H ¶ 7-8.

[19] Appendix E at 5, Assessment of FCC Quantile Regression Methods for Estimation of Reimburseable Cost Limits, by Dr. Roger Koenker.

[20] *Id*. at 6-7. "Without modeling these dependencies explicitly it is impossible to draw any meaningful conclusions about aggregate inefficiency from observations on individual cost components and their marginal quantiles."

[21] *Further Notice* ¶ 1081; Appendix H, ¶¶ 11, 21-26.

[22] *See also* Appendix E at 7-8. The Commission's addition of "1" to each variable to enable regression based on logarithmic transformations erroneously represents values of some variables as being non-zero. The Commission's models should instead have stratified any model which used a variable equal to zero for a group of study areas. Dr. Koenker points out that this technique is particularly risky with categorical data, such as counts of urban cluster census blocks.

Statistical regression of any type is a test of a hypothesis which can be stated as follows: the dependent variable can be better estimated by reflecting levels of designated independent variables of each observation than by using a simple mean as a common estimate for all observations. If the test is statistically significant, the hypothesis passes; otherwise it fails. Yet the Commission proposes limitation models whose associated t-statistics show that most of the hypotheses have failed; i.e., most of the variables in the Commission's models are not statistically significant.

It is important to note that, even if an independent variable is not statistically significant in a model, it nevertheless influences values of estimates which would be calculated using the model. This is to say that, even though use of the variable adds no more useful information about the estimate than using a simple overall mean, including the variable in the model yet introduces arbitrary variance in model estimates. For these reasons, independent variables should be included in models only to the extent they are statistically significant.[23]

This concern is also addressed by Dr. Koenker, who points out that inclusion of non-significant independent variables in a model increases variance of all coefficients, thereby weakening the power of the model to estimate accurately.[24]

Furthermore, even if statistically significant, the Commission's models purport to use data that is actually unknown. As noted above, the models use housing units, land area and census block counts by urban/rural category. The map of census data to study areas is done by census block to achieve the greatest granularity of census data, thereby maximizing the accuracy of assigning census attributes to study areas.[25]

When data is reported by census tract, it is less granular than by census block group, which is in turn less granular than data reported by census block. Although the Commission's models purport to use urban/rural designation by census block, the United States Census does not record this data by census block. Indeed, data from the 2010 census necessary to distinguish between urban and rural areas has not yet been released at any level. The Census Bureau has announced that, when released, urban/rural data will be reported only at the census tract level.[26] The

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[23] Statistical significance is defined at a designated level of confidence. For example, an independent variable could be significant at the 95% confidence level. The level of confidence used for this decision should not be less than the quantile a model is used to estimate. For example, it makes little sense to say that a model has estimated the 90th percentile of data with a confidence level of 80%.

[24] Appendix E at 7.

[25] Census data is collected in a hierarchy of geographical units, the smallest of which is a census block. A census block group is a collection of census blocks, while a census tract is a collection of census block groups. Each county is a collection of census tracts.

[26] *See* United States Census 2010, Data Products, At-a-Glance (Version 1.8) (rel. Dec. 15, 2011), available at http://www.census.gov/population/www/cen2010/glance/files/At_A_Glance-v1.8.pdf

Commission's models therefore use urban/rural designations from the 2000 census, which was reported by census block group, not by census block.

Use of this source of urban/rural designation suffers from two flaws. First, it is out of date. Census blocks have changed in shape, population and character since 2000. Second, this data does not characterize a census block, but rather spreads the urban/rural designation of the entire block group across every block in the group. By this method, a study area that is entirely rural could be designated as urban merely because part of it is in a block group that contains an urban area.

This flaw will be greater yet when urban/rural designations are released based on the 2010 census. At that time, the designation assigned to a census tract (a comparatively very large area) will be spread across every block in the tract, thereby substantially multiplying the inaccuracy of the urban/rural designation to study areas.

Considering these concerns, it appears that the limitation models should rely only on data reported by census block, and should avoid data reported only for larger geographic areas. At a minimum, the urban/rural designation should be dropped, leaving housing units, land area, per cent water and census blocks as independent variables.

If the Commission nevertheless determines that census data will be used in limitation models, it should clarify what census data will be used in updates. For example, will models will based on updated costs and loop counts each year, but on the same census data for ten consecutive years?[27] Or will interim updates to census data be reflected?

The Commission should also determine that whatever limitation method is used produces predictable results from year to year. It could be tested, for example, whether the models based on 2010 accounts and other variables would be reasonably and predictably similar to those that would have been obtained if 2009 accounts had been used. What would have been the result if compared to a model based on 2009 accounts and the 2000 census data?

F. The Commission's models would have severe effects.

As shown above, use of quantile regression models in the manner described by the Commission would be substantially arbitrary. Notwithstanding this arbitrariness, financial impacts of these methods would be very significant. Details of effects for each cost company study area are shown in Appendix 1. Of 720 total study areas, 283 would experience cost per loop reductions causing payment reductions. In addition nine study areas would experience cost per loop reductions, but would receive no support payments either before or after reductions, showing that the method proposed by the Commission is not even targeted to affect only high cost study areas. Cost per loop reductions are summarized in Exhibits 8A and 8B.

[27] To the extent that 2010 census data is used in limitation models in repeated years, the correlation between census data and cost data can be expected to erode, thereby reducing the value of census data in the models.

Exhibit 8A
Summary of Impacts of the Commission's Quantile Models
By Per Cent Impact on Cost per Loop

Percent Impact on CPL	Counts of Study Areas	% Impact on HCL Support Payments
No Impact	422	0.00%
Less than 10%	207	-7.77%
10% to 20%	52	-25.66%
20% to 30%	21	-36.33%
30% to 40%	12	-47.40%
40% to 50%	2	-45.80%
50% to 60%	2	-53.79%
60% to 70%	1	-65.99%
70% to 80%	0	0.00%
80% to 90%	1	-85.66%
All study areas	720	-14.12%

Exhibit 8A shows that 298 study areas would have cost per loop affected by the limits based on the Commission's models. Thus, while each quantile model aims to limit data of 10% of study areas, different study areas are affected by each model, resulting in 41% of study areas being limited by one or more models. Thus, while the Commission represents that its models limit costs in 10% of cases, in fact those models would have significant impacts on support payments to a much larger set of carriers.

Of the total 298 affected by limits, CPL of 91 would be affected by 10% or more. Companies in the higher ranges of cost per loop impact would tend to have about the same proportionate impact on cost per loop and on HCL support payments. Companies in the lower ranges of cost per loop impact tend to have payment impacts significantly larger than their cost per loop impacts. Overall, the Commission's limits would reduce average cost per loop by 5.1%, but would, as shown above, reduce support payments by 14.1%.

Exhibit 8B
Summary of Impacts of the Commission's Quantile Models
By Cost per Loop Change

CPL Impact	Counts of Study Areas	% Impact on HCL Support Payments
No Impact	422	0.00%
Less than $10	51	-1.00%
$10 to $20	34	-3.36%
$20 to $30	21	-5.44%
$30 to $50	34	-9.03%
$50 to $100	47	-12.01%
$100 to $200	45	-23.53%
$200 to $500	35	-27.39%
$500 to $1000	18	-36.81%
$1000 to $5000	8	-42.94%
Greater than $5000	5	-79.83%
All study areas	720	-14.12%

Exhibit 8B shows that dollar impacts on cost per loop based on the Commission's limits would also be quite significant. Reductions of more than $10 per loop would be realized by 244 study areas. Of these 111 would experience reductions exceeding $100 per loop.

G. If the Commission Does Require Models for ICLS , Methods Not Yet Made Public Will Be Needed.

The Commission's *Order* concludes that similar methods be used to limit costs eligible for interstate common line support (ICLS). As explained in the *December 29 Petition for Reconsideration*, this decision was premature.[28] ICLS is paid initially based on projected data, and is later trued up to reflect actual accounts for the year of payments. Furthermore, the data lines needed to calculate ICLS are quite different than those needed to calculate high cost loop support. For example, while high cost loop support payments in 2013 will reflect 2011 accounts, ICLS payments in that year will reflect current accounting data.

For these reasons, different models would be needed for ICLS than for high cost loop support. This would have the effect of putting in use two different sets of limiting models during the same support payment periods, one for high cost loop support, the other for ICLS.

[28] *December 29 Petition for Reconsideration* at 11-12.

The Commission must also clarify which data lines would be subject to models, and which model structures that would apply to ICLS.

Furthermore, as noted above, ICLS is initially based on projected cost data, which is trued up after the support payment year is over. If the Commission is to require any models at all for ICLS, they must take effect at the beginning of the support payment period. Consequently, it would be necessary to base ICLS limitation models on projected data.[29]

Considering the extensive absence of methods, rationale and impact assessment, it was premature for the Commission to conclude that statistical models to limit capital and operating expenses should apply to ICLS.

[29] In addition, the Commission must provide reasonable notice each year of limitation models for both high cost loop support and ICLS. High cost loop support data is submitted to NECA beginning in July each year, and filed with the FCC at the beginning of October. Projected ICLS data is submitted to NECA throughout the second quarter of each year and filed with fifteen days notice preceding each July 1 tariff effective date. The Commission must provide timetables to integrate development of limitation models with these processes.

Appendix D-Attachment 1

Payments and Per Loop Costs per Commission CAPEX and OPEX Quantile Models Using 2012 HCL Payments

Attachment 1

Payments and Per Loop Costs per Commission CAPEX and OPEX Quantile Models Using 2012 HCL Payments
Algorithm Line Results per Loop - Actuals Reported and Applied by FCC
Other Data Lines Also Change Because Their Calculation Depends On Lines Changed by the Models

Seq	Source	CWF	COE	M&S CWF	M&S COE	CWF Maint	COE Maint	NetSup + GSE	Net Ops	Depr CWF	Depr COE	Bene Fits	Pmt (000s)	Pmt Chg (000s)	Chg per Loop / 12
1	Actual	9548	32164	0	0	626	2307	670	241	569	3306	171	232		
	Limit	9548	3915	0	0	626	607	304	241	569	527	171	79	-153	-638
2	Actual	40649	19481	697	334	160	1231	496	1100	1861	1830	0	1099		
	Limit	25258	6513	196	43	160	538	220	375	1162	494	0	527	-572	-496
3	Actual	42182	3963	42	4	98	278	191	780	1614	493	354	15181		
	Limit	6776	2083	42	4	98	97	80	122	244	123	95	2177	-13,004	-464
4	Actual	42385	2035	0	0	1750	207	136	1071	2497	192	12	263		
	Limit	24589	2035	0	0	761	207	136	422	1088	192	12	136	-127	-352
5	Actual	18167	4468	396	97	1012	864	940	1170	904	401	645	1347		
	Limit	13531	2780	81	14	473	293	214	187	581	330	270	736	-610	-337
6	Actual	32555	1158	1399	50	0	15	284	352	1344	116	13	939		
	Limit	17951	1158	167	50	0	15	284	352	833	116	13	540	-398	-204
7	Actual	6006	11764	118	231	35	804	107	405	140	1157	0	690		
	Limit	6006	3150	86	17	35	278	107	230	140	276	0	300	-391	-195
8	Actual	29288	4616	83	13	114	74	77	309	979	313	128	2380		
	Limit	15044	4616	83	13	114	74	77	309	751	246	128	1483	-897	-144
9	Actual	27930	8350	119	36	312	403	165	311	1301	663	915	3584		
	Limit	18970	4814	119	36	312	295	165	200	853	382	337	2173	-1,411	-141
10	Actual	16570	1187	554	40	296	234	237	380	882	108	226	721		
	Limit	9906	1187	60	11	296	204	128	187	478	108	160	419	-302	-116
11	Actual	22261	2655	67	8	73	207	71	31	955	209	85	2624		
	Limit	11452	2655	67	8	73	182	71	31	544	209	85	1479	-1,145	-94
12	Actual	12948	2921	9	2	259	233	171	39	680	322	285	5617		
	Limit	8166	2094	9	2	174	116	83	39	409	172	156	2920	-2,697	-84
13	Actual	18500	1534	0	0	122	135	23	34	531	134	16	1274		
	Limit	11296	1534	0	0	122	135	23	34	531	134	16	860	-414	-72

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Seq	Source	CWF	COE	M&S CWF	M&S COE	CWF Maint	COE Maint	NetSup + GSE	Net Ops	Depr CWF	Depr COE	Bene Fits	Pmt (000s)	Pmt Chg (000s)	Chg per Loop / 12
14	Actual	15786	1909	0	0	127	4	21	62	794	243	100	427		
	Limit	10402	1909	0	0	127	4	21	62	466	191	100	272	-156	-61
15	Actual	10439	6088	125	73	206	322	247	175	486	360	315	12808		
	Limit	10439	2590	125	48	206	156	123	123	486	205	235	9166	-3,643	-54
16	Actual	8116	6067	197	147	252	231	73	131	411	351	212	5028		
	Limit	8116	2066	108	25	214	120	73	125	411	181	188	3406	-1,622	-51
17	Actual	12078	1944	5	1	229	120	53	98	581	287	116	3068		
	Limit	8376	1944	5	1	183	120	53	98	414	179	116	2105	-963	-47
18	Actual	14200	5426	204	78	301	371	86	566	605	178	31	1078		
	Limit	13855	3653	118	26	301	265	86	228	605	178	31	910	-168	-47
19	Actual	7245	2330	96	31	326	179	195	218	331	234	323	11876		
	Limit	7055	1589	96	25	177	91	74	87	331	142	184	7124	-4,751	-47
20	Actual	15942	2065	76	10	164	144	36	17	631	107	110	1235		
	Limit	11333	2065	76	10	164	144	36	17	534	107	110	927	-308	-42
21	Actual	4053	952	2	1	546	106	111	185	320	109	334	2145		
	Limit	4053	952	2	1	182	106	94	128	320	109	144	1504	-641	-39
22	Actual	5964	695	51	6	258	194	139	139	359	109	307	1504		
	Limit	5601	695	43	6	169	98	81	102	282	109	100	1029	-475	-39
23	Actual	11194	952	134	11	11	35	44	40	434	115	75	2404		
	Limit	7059	952	72	11	11	35	44	40	355	115	75	1541	-863	-39
24	Actual	11082	2957	99	26	126	194	135	162	586	251	182	3065		
	Limit	9076	2335	99	25	126	135	94	120	448	191	166	2273	-792	-36
25	Actual	3428	586	6	1	443	66	319	44	139	39	121	4657		
	Limit	3428	586	6	1	139	66	64	44	139	39	103	1735	-2,922	-36
26	Actual	9629	426	125	6	81	28	17	85	514	23	84	1409		
	Limit	5947	426	56	6	81	28	17	85	300	23	84	723	-686	-36

Payments and Per Loop Costs per Commission CAPEX and OPEX Quantile Models Using 2012 HCL Payments
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Other Data Lines Also Change Because Their Calculation Depends On Lines Changed by the Models

Seq	Source	CWF	COE	M&S CWF	M&S COE	CWF Maint	COE Maint	NetSup + GSE	Net Ops	Depr CWF	Depr COE	Bene Fits	Pmt (000s)	Pmt Chg (000s)	Chg per Loop / 12
27	Actual	6980	2271	14	5	97	218	292	217	341	228	442	1998		
	Limit	6980	2271	14	5	97	157	138	137	341	215	166	1494	-504	-36
28	Actual	10503	887	167	14	55	39	35	50	634	68	97	4294		
	Limit	6144	887	88	14	55	39	35	50	286	68	97	1627	-2,667	-34
29	Actual	8049	1762	12	3	126	77	34	295	774	181	0	512		
	Limit	8049	1762	12	3	126	77	34	151	397	181	0	405	-108	-32
30	Actual	12845	654	33	2	108	33	28	54	740	40	92	1245		
	Limit	10569	654	33	2	108	33	28	54	521	40	92	961	-284	-32
31	Actual	2564	558	30	6	364	51	34	344	69	14	231	309		
	Limit	2564	558	30	6	188	51	34	140	69	14	105	120	-189	-31
32	Actual	8071	1556	10	2	80	21	46	30	616	133	136	9759		
	Limit	6584	1556	10	2	80	21	46	30	275	133	136	6037	-3,721	-29
33	Actual	8372	1650	6	1	97	50	112	31	483	146	91	2040		
	Limit	6227	1492	6	1	97	50	73	31	315	143	91	1375	-665	-27
34	Actual	4300	952	42	9	406	118	57	116	250	96	327	1811		
	Limit	4300	952	42	9	176	118	57	110	250	96	140	1267	-544	-26
35	Actual	3091	336	20	2	518	61	55	212	155	24	0	1073		
	Limit	3091	336	20	2	200	61	55	104	155	24	0	609	-464	-26
36	Actual	3987	461	6	1	490	24	20	199	39	41	64	1768		
	Limit	3987	461	6	1	170	24	20	114	39	41	64	791	-977	-25
37	Actual	4102	2862	25	17	142	337	5	37	189	439	100	1530		
	Limit	4102	2862	25	17	142	177	5	37	189	224	100	1254	-277	-23
38	Actual	11428	2794	28	7	192	107	70	55	451	296	123	1063		
	Limit	9684	2298	28	7	192	107	70	55	451	221	123	910	-152	-23
39	Actual	11116	3201	415	119	159	235	201	13	627	66	249	3396		
	Limit	11116	2934	159	39	159	155	112	13	535	66	203	2737	-659	-22

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40	Actual	8190	682	129	11	85	36	16	103	282	76	45	3786		
	Limit	4616	682	58	11	85	36	16	61	230	76	45	1791	-1,995	-22
41	Actual	8982	1838	126	26	237	410	48	69	439	189	253	2310		
	Limit	8982	1838	95	20	225	149	48	69	433	189	185	1988	-323	-22
42	Actual	7514	1119	8	1	18	29	30	12	337	110	31	1135		
	Limit	4968	1119	8	1	18	29	30	12	251	110	31	680	-455	-21
43	Actual	8695	2485	114	32	156	152	81	179	341	255	245	5681		
	Limit	8695	1652	47	20	145	152	81	103	341	91	245	4764	-918	-21
44	Actual	5618	453	24	2	274	28	73	112	290	64	278	3270		
	Limit	5618	453	24	2	137	28	73	82	290	64	116	2373	-897	-20
45	Actual	5692	994	150	26	203	398	91	257	132	79	250	1234		
	Limit	5692	994	150	26	203	200	91	159	132	79	228	952	-282	-19
46	Actual	6208	2745	406	180	596	256	231	357	340	395	346	333		
	Limit	6208	2745	116	22	483	256	231	262	340	395	294	306	-26	-19
47	Actual	2167	636	1	0	180	18	39	419	43	43	12	461		
	Limit	2167	636	1	0	180	18	39	112	43	43	12	283	-179	-19
48	Actual	3986	1897	0	0	228	139	25	42	175	164	245	877		
	Limit	3986	1414	0	0	186	102	25	42	175	133	110	645	-232	-19
49	Actual	7455	629	44	4	177	28	72	51	186	38	132	3920		
	Limit	4513	629	44	4	105	28	60	51	186	38	99	1853	-2,067	-19
50	Actual	3886	3730	24	23	88	274	50	43	123	228	164	1564		
	Limit	3886	2222	24	23	88	142	50	43	123	218	164	1186	-377	-17
51	Actual	11880	2187	42	8	104	110	109	115	490	176	215	7769		
	Limit	10145	2187	42	8	104	110	109	93	425	176	215	6775	-994	-17
52	Actual	5007	1800	18	6	22	65	24	58	339	223	49	2143		
	Limit	4900	1186	18	6	22	65	24	58	251	109	49	1494	-650	-17

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53	Actual	6408	2250	16	6	77	89	97	96	369	254	140	7108		
	Limit	6408	1506	16	6	77	78	96	67	296	147	140	5425	-1,683	-16
54	Actual	4901	932	11	2	406	83	221	77	230	89	143	747		
	Limit	4901	932	11	2	241	83	104	77	230	89	143	604	-143	-16
55	Actual	7613	784	21	2	114	50	16	385	176	85	154	1199		
	Limit	7613	784	21	2	114	50	16	132	176	85	145	985	-214	-16
56	Actual	4074	773	55	10	195	84	71	69	233	81	176	5712		
	Limit	4068	773	52	10	108	48	56	64	198	81	99	3389	-2,323	-16
57	Actual	4003	892	79	17	74	27	42	133	476	48	32	516		
	Limit	4003	892	41	8	74	27	42	94	268	48	32	330	-186	-16
58	Actual	8489	1127	44	6	188	53	53	38	248	54	62	1494		
	Limit	5984	1127	44	6	159	53	53	38	248	54	62	1097	-397	-15
59	Actual	10942	827	54	4	104	118	49	141	620	138	222	1040		
	Limit	10536	827	54	4	104	118	49	141	512	138	171	960	-80	-15
60	Actual	9751	4174	125	54	128	142	70	231	414	117	206	2320		
	Limit	9751	2505	113	26	128	142	70	129	414	117	174	2051	-269	-15
61	Actual	7359	1131	10	2	54	66	20	36	392	119	46	1123		
	Limit	6326	1131	10	2	54	66	20	36	305	119	46	916	-207	-14
62	Actual	6783	831	125	15	463	66	78	51	315	41	48	398		
	Limit	6783	831	53	10	248	66	78	51	315	41	48	331	-67	-14
63	Actual	2334	1655	7	5	95	71	31	4	98	203	17	742		
	Limit	2334	1074	7	5	83	71	31	4	98	81	17	451	-290	-13
64	Actual	6208	1528	29	7	214	83	150	32	241	151	151	6705		
	Limit	6208	1528	29	7	129	80	66	32	241	133	128	5675	-1,030	-13
65	Actual	3845	258	8	1	70	12	284	90	235	8	54	1963		
	Limit	3845	258	8	1	70	12	75	86	235	8	54	1271	-692	-13

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66	Actual	9724	1180	58	7	82	54	30	17	532	88	71	3208		
	Limit	8709	1180	58	7	82	54	30	17	415	88	71	2669	-539	-13
67	Actual	5098	1414	22	6	328	84	105	33	353	163	160	3430		
	Limit	5098	1414	22	6	159	84	87	33	353	159	152	2834	-596	-12
68	Actual	6469	831	6	1	41	42	54	63	292	51	125	2213		
	Limit	5345	831	6	1	41	42	54	63	204	51	109	1554	-659	-12
69	Actual	3914	1335	125	43	59	18	59	48	559	152	25	458		
	Limit	3914	1335	61	13	59	18	59	48	379	152	25	367	-91	-12
70	Actual	5340	2179	87	36	31	26	34	38	309	187	67	2347		
	Limit	5203	1287	62	14	31	26	34	38	265	117	67	1697	-650	-12
71	Actual	5951	1049	34	6	354	36	42	36	254	101	86	1009		
	Limit	5951	1049	34	6	177	36	42	36	254	101	86	822	-187	-11
72	Actual	5126	738	40	6	85	15	29	41	290	77	67	1980		
	Limit	3445	738	40	6	85	15	29	41	170	77	67	565	-1,415	-11
73	Actual	6149	1990	9	3	64	85	21	44	482	260	75	567		
	Limit	6149	1990	9	3	64	85	21	44	402	175	75	493	-74	-10
74	Actual	2998	351	27	3	397	27	21	32	105	11	100	315		
	Limit	2998	351	27	3	236	27	21	32	105	11	100	203	-112	-10
75	Actual	5513	461	51	4	108	30	18	35	282	26	80	1662		
	Limit	4594	461	43	4	108	30	18	35	237	26	80	1279	-383	-10
76	Actual	2047	604	0	0	398	75	23	49	98	16	38	276		
	Limit	2047	604	0	0	242	75	23	49	98	16	38	227	-48	-10
77	Actual	11178	4092	0	0	363	191	105	154	403	506	19	1688		
	Limit	11178	4092	0	0	363	191	105	154	403	351	19	1580	-109	-10
78	Actual	5172	1459	96	27	175	190	91	63	410	108	68	3565		
	Limit	5172	1459	96	25	151	102	83	63	374	108	68	3099	-466	-10

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79	Actual	7109	508	213	15	53	91	25	147	305	47	159	597		
	Limit	6645	508	48	10	53	91	25	127	305	47	113	530	-68	-10
80	Actual	6887	2117	3	1	111	66	28	35	435	119	49	1080		
	Limit	6887	1561	3	1	111	66	28	35	346	119	49	961	-118	-10
81	Actual	3574	1576	7	3	61	79	84	59	189	86	46	2547		
	Limit	3574	846	7	3	61	48	51	55	186	86	46	1745	-802	-9
82	Actual	4734	1199	60	15	288	93	70	22	107	65	211	853		
	Limit	4734	1199	60	15	198	93	70	22	107	65	152	684	-170	-9
83	Actual	4087	382	12	1	238	27	41	103	230	44	66	1677		
	Limit	4087	382	12	1	117	27	41	78	230	44	66	1290	-386	-9
84	Actual	2755	373	18	2	93	17	213	72	149	50	44	831		
	Limit	2755	373	18	2	93	17	74	72	149	50	44	495	-336	-9
85	Actual	4440	1701	67	26	61	60	35	21	189	167	44	2163		
	Limit	4295	1074	48	11	61	60	35	21	189	96	44	1657	-506	-8
86	Actual	7818	2959	17	7	139	147	142	79	418	197	65	3870		
	Limit	7818	2397	17	7	139	123	90	79	418	190	65	3522	-348	-8
87	Actual	5122	1388	7	2	100	364	83	28	35	0	41	237		
	Limit	5122	1388	7	2	100	229	83	28	35	0	41	209	-28	-8
88	Actual	5752	546	37	4	116	41	40	44	374	17	161	3698		
	Limit	5741	546	37	4	116	41	40	44	285	17	121	3012	-686	-8
89	Actual	5491	727	105	14	168	168	43	48	361	138	208	1302		
	Limit	5491	727	73	14	168	118	43	48	361	138	135	1165	-137	-8
90	Actual	12005	2967	24	6	63	149	141	78	385	241	376	1181		
	Limit	12005	2967	24	6	63	149	141	78	385	241	247	1117	-64	-8
91	Actual	4703	753	34	5	353	125	41	11	204	63	59	317		
	Limit	4703	753	34	5	233	125	41	11	204	63	59	279	-38	-7

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92	Actual	5306	1176	13	3	138	91	36	32	198	97	115	14600		
	Limit	4653	1092	13	3	138	66	36	32	198	90	107	12391	-2,209	-7
93	Actual	3184	1374	4	2	126	254	18	14	167	122	133	941		
	Limit	3184	1374	4	2	126	135	18	14	167	122	133	770	-170	-7
94	Actual	3399	1586	5	3	102	111	38	73	156	206	86	986		
	Limit	3399	1313	5	3	102	85	38	73	156	133	86	769	-216	-7
95	Actual	3842	232	26	2	68	5	213	80	210	13	16	183		
	Limit	3842	232	26	2	68	5	94	80	210	13	16	122	-61	-7
96	Actual	6290	2356	28	10	154	78	94	84	192	300	161	1972		
	Limit	6290	2346	28	10	154	78	93	84	192	187	160	1783	-188	-7
97	Actual	2287	823	25	9	95	28	22	119	102	77	15	4606		
	Limit	2287	648	25	7	72	28	22	68	102	57	15	2789	-1,817	-7
98	Actual	3145	975	0	0	69	111	104	104	172	101	48	884		
	Limit	3145	975	0	0	69	66	63	75	172	101	48	610	-274	-7
99	Actual	5205	1135	45	10	99	30	81	53	164	149	111	2529		
	Limit	4748	1135	45	10	99	30	65	53	164	109	100	2123	-406	-7
100	Actual	4458	1199	11	3	313	56	91	51	201	59	116	1453		
	Limit	4458	1199	11	3	202	56	91	51	201	59	116	1178	-275	-7
101	Actual	3450	1389	54	22	50	39	16	32	157	154	59	3809		
	Limit	3447	756	54	11	50	38	16	32	157	69	59	1699	-2,110	-7
102	Actual	2942	389	7	1	58	9	218	71	117	30	28	262		
	Limit	2942	389	7	1	58	9	112	71	117	30	28	155	-107	-7
103	Actual	4293	1085	79	20	84	64	51	55	150	95	204	7087		
	Limit	4293	1085	79	18	84	42	51	55	150	93	122	5128	-1,959	-7
104	Actual	14132	1231	146	13	152	39	42	99	580	99	133	1600		
	Limit	12849	1231	146	13	152	39	42	99	580	99	133	1507	-93	-7

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105	Actual	3207	950	89	26	223	172	28	1	158	94	78	894		
	Limit	3207	950	85	19	174	118	28	1	158	94	78	750	-145	-6
106	Actual	7424	1035	36	5	291	44	18	3	476	88	74	1856		
	Limit	7424	1035	36	5	189	44	18	3	476	88	74	1678	-179	-6
107	Actual	7267	1382	107	20	290	176	169	69	343	141	165	910		
	Limit	7267	1382	106	20	224	176	132	69	343	141	165	853	-57	-6
108	Actual	5218	2394	20	9	139	94	37	63	210	157	46	679		
	Limit	5218	1489	20	9	139	94	37	63	210	157	46	612	-67	-6
109	Actual	3502	1193	20	7	62	42	71	46	145	83	81	5116		
	Limit	3283	732	20	7	62	37	50	46	145	61	80	3447	-1,669	-6
110	Actual	2990	85	6	0	43	4	219	67	149	3	28	319		
	Limit	2990	85	6	0	43	4	122	67	149	3	28	228	-91	-6
111	Actual	11630	1468	41	5	115	68	142	87	507	101	180	3218		
	Limit	10674	1468	41	5	115	68	112	87	507	101	180	3010	-208	-6
112	Actual	9311	453	17	1	55	33	42	58	357	48	240	1599		
	Limit	9068	453	17	1	55	33	42	58	357	48	170	1465	-134	-6
113	Actual	7570	1661	22	5	97	73	49	224	386	175	142	1172		
	Limit	7570	1661	22	5	97	73	49	130	386	175	142	1094	-78	-6
114	Actual	7703	1869	48	12	145	220	93	81	401	267	123	789		
	Limit	7703	1869	48	12	145	188	93	81	401	205	123	766	-22	-6
115	Actual	7885	1588	30	6	115	49	52	85	188	137	105	1798		
	Limit	6969	1588	30	6	115	49	52	85	188	137	105	1638	-160	-6
116	Actual	6612	624	4	0	95	23	21	15	518	48	35	416		
	Limit	6612	624	4	0	95	23	21	15	429	48	35	380	-36	-6
117	Actual	2318	1094	10	5	20	110	50	54	115	80	50	1627		
	Limit	2318	726	10	5	20	42	50	54	115	69	50	793	-834	-6

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118	Actual	2288	238	19	2	57	17	173	66	124	19	58	855		
	Limit	2288	238	19	2	57	17	70	66	124	19	58	353	-502	-6
119	Actual	5991	1190	5	1	88	47	190	56	234	132	95	476		
	Limit	5991	1190	5	1	88	47	104	56	234	132	95	454	-22	-5
120	Actual	8501	2351	81	22	38	106	74	133	477	161	143	3029		
	Limit	8501	2225	81	22	38	106	74	107	427	161	143	2852	-177	-5
121	Actual	12171	1360	578	65	148	127	56	137	334	78	243	5969		
	Limit	11645	1360	212	56	148	125	56	130	334	78	243	5619	-350	-5
122	Actual	4244	885	10	2	151	65	31	72	216	105	179	633		
	Limit	4244	885	10	2	151	65	31	72	216	105	98	566	-67	-5
123	Actual	2522	69	12	0	35	4	171	49	123	3	22	117		
	Limit	2522	69	12	0	35	4	81	49	123	3	22	62	-55	-5
124	Actual	11214	1541	154	21	77	94	30	39	330	90	113	1882		
	Limit	10608	1541	122	21	77	94	30	39	330	90	113	1796	-86	-5
125	Actual	5020	601	100	12	54	23	25	150	243	63	87	5207		
	Limit	5020	601	87	12	54	23	25	77	242	63	87	4342	-865	-5
126	Actual	8691	793	49	4	100	29	52	85	394	70	100	5140		
	Limit	8187	793	49	4	100	29	52	85	366	70	100	4799	-341	-5
127	Actual	5627	1097	14	3	77	196	53	99	155	61	238	390		
	Limit	5627	1097	14	3	77	175	53	99	155	61	184	365	-25	-5
128	Actual	3442	1125	12	4	225	77	17	26	112	83	32	884		
	Limit	3442	1125	12	4	150	77	17	26	112	83	32	723	-161	-5
129	Actual	3911	551	73	10	45	12	33	37	231	51	60	5136		
	Limit	3911	551	51	10	45	12	33	37	156	51	60	3110	-2,026	-4
130	Actual	4538	1808	19	7	109	146	36	27	185	147	82	363		
	Limit	4538	1466	19	7	109	117	36	27	185	142	82	334	-30	-4

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131	Actual	4979	1045	21	4	87	71	22	77	251	72	36	1666		
	Limit	4595	1045	21	4	87	70	22	70	237	72	36	1510	-156	-4
132	Actual	8037	2748	44	15	256	182	25	62	246	142	120	2157		
	Limit	8037	2682	44	15	218	157	25	62	246	142	120	2060	-98	-4
133	Actual	3889	1132	29	8	65	53	51	59	228	137	158	2232		
	Limit	3889	1132	29	8	65	53	51	59	228	110	116	2032	-200	-4
134	Actual	6727	1814	14	4	137	148	39	148	357	253	0	867		
	Limit	6727	1814	14	4	137	148	39	141	357	192	0	831	-36	-4
135	Actual	6603	2072	91	29	140	77	40	64	266	249	122	3895		
	Limit	6603	2072	91	29	140	77	40	64	266	182	122	3641	-254	-4
136	Actual	4531	723	17	3	70	62	102	51	185	62	87	1839		
	Limit	4390	723	17	3	70	62	66	51	185	62	81	1701	-139	-4
137	Actual	2245	842	3	1	45	26	33	7	108	105	29	710		
	Limit	2245	590	3	1	45	26	33	7	108	48	29	102	-607	-4
138	Actual	5250	879	8	1	43	26	25	12	271	73	42	2265		
	Limit	4888	879	8	1	43	26	25	12	236	73	42	1800	-465	-4
139	Actual	5081	770	27	4	62	27	21	33	269	108	73	2019		
	Limit	4734	770	27	4	62	27	21	33	239	108	73	1763	-256	-4
140	Actual	3065	569	38	7	289	99	38	106	87	34	171	534		
	Limit	3065	569	38	7	236	99	38	106	87	34	165	503	-31	-4
141	Actual	9993	2282	17	4	121	53	46	59	324	271	159	1371		
	Limit	9993	2282	17	4	121	53	46	59	324	211	159	1323	-48	-4
142	Actual	3722	864	19	4	74	53	39	39	235	75	68	4358		
	Limit	3678	864	19	4	74	44	39	39	192	75	68	3816	-542	-4
143	Actual	5722	1679	24	7	145	10	31	70	343	153	128	2546		
	Limit	5722	1522	24	7	145	10	31	70	314	138	128	2399	-147	-3

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144	Actual	5536	764	15	2	223	102	123	54	111	60	137	875		
	Limit	5536	764	15	2	192	102	98	54	111	60	137	826	-49	-3
145	Actual	6917	2310	19	6	130	88	180	70	344	253	85	865		
	Limit	6917	2310	19	6	130	88	136	70	344	243	85	834	-30	-3
146	Actual	4859	2447	54	27	87	126	21	70	194	189	0	2043		
	Limit	4859	2042	54	22	87	123	21	70	194	189	0	1950	-92	-3
147	Actual	6327	1353	34	7	48	44	36	19	397	67	47	2580		
	Limit	6327	1353	34	7	48	44	36	19	344	67	47	2416	-164	-3
148	Actual	3049	1064	39	14	116	96	47	43	157	122	101	1184		
	Limit	3049	1064	39	10	116	68	47	43	157	106	92	1049	-135	-3
149	Actual	5212	375	0	0	249	47	190	58	204	37	129	205		
	Limit	5212	375	0	0	249	47	138	58	204	37	129	191	-13	-3
150	Actual	5365	969	61	11	148	95	33	101	293	59	187	668		
	Limit	5365	969	61	11	148	95	33	101	293	59	136	636	-32	-3
151	Actual	2960	878	23	7	96	54	119	75	80	111	72	805		
	Limit	2960	878	23	7	96	54	67	75	80	111	72	706	-99	-3
152	Actual	3410	1394	21	9	30	19	15	28	184	149	52	1355		
	Limit	3410	1201	21	9	30	19	15	28	184	108	52	1138	-217	-3
153	Actual	2845	811	11	3	70	82	61	105	154	85	51	471		
	Limit	2845	811	11	3	70	62	61	75	154	85	51	371	-100	-3
154	Actual	4936	985	123	24	105	61	62	11	288	22	65	2806		
	Limit	4936	985	60	13	105	59	58	11	253	22	65	2521	-285	-3
155	Actual	2773	458	28	5	227	55	40	90	116	37	80	452		
	Limit	2773	458	28	5	178	55	40	90	116	37	80	417	-36	-3
156	Actual	5235	1096	8	2	176	127	66	199	259	95	138	793		
	Limit	5235	1096	8	2	176	127	66	150	259	95	138	765	-29	-3

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157	Actual	2676	999	48	18	192	73	55	81	233	110	37	1154		
	Limit	2676	999	46	10	147	73	55	80	233	110	37	1078	-76	-3
158	Actual	4904	1134	41	10	80	79	27	111	237	61	147	1944		
	Limit	4904	1134	41	10	80	79	27	85	237	61	126	1817	-127	-3
159	Actual	3162	554	23	4	238	42	36	105	161	19	109	447		
	Limit	3162	554	23	4	191	42	36	105	161	19	109	402	-45	-3
160	Actual	7361	2007	295	80	290	288	70	27	151	186	168	762		
	Limit	7361	2007	149	34	290	264	70	27	151	186	168	745	-16	-3
161	Actual	3678	609	29	5	96	19	24	73	75	21	67	1762		
	Limit	3516	609	29	5	85	19	24	46	75	21	67	1244	-518	-3
162	Actual	3275	797	16	4	100	69	144	36	116	56	75	161		
	Limit	3275	797	16	4	100	69	98	36	116	56	75	144	-17	-3
163	Actual	3511	590	19	3	40	34	85	52	207	23	112	3862		
	Limit	3511	590	19	3	40	34	60	52	193	23	107	3160	-702	-3
164	Actual	5435	1355	15	4	52	48	33	95	300	108	94	5295		
	Limit	5435	1355	15	4	52	48	33	75	274	108	94	4834	-462	-3
165	Actual	4643	1192	469	120	194	44	18	32	121	73	129	985		
	Limit	4643	1192	162	40	194	44	18	32	121	73	129	911	-74	-3
166	Actual	6054	625	33	3	112	46	58	38	298	59	91	1058		
	Limit	5723	625	33	3	112	46	58	38	287	59	91	996	-62	-3
167	Actual	2371	774	5	2	75	111	25	25	49	27	73	406		
	Limit	2371	774	5	2	75	62	25	25	49	27	73	299	-107	-3
168	Actual	3775	1362	6	2	109	94	54	30	168	137	102	581		
	Limit	3775	1204	6	2	109	94	54	30	168	113	101	549	-33	-3
169	Actual	2901	1603	13	7	210	97	11	66	130	154	135	1268		
	Limit	2901	1603	13	7	168	97	11	66	130	154	135	1184	-84	-3

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170	Actual	3028	711	56	13	126	55	77	34	166	67	84	2359		
	Limit	3028	711	53	12	100	55	61	34	166	67	84	2117	-243	-3
171	Actual	3412	426	55	7	82	17	44	40	135	28	19	1374		
	Limit	3036	426	41	7	69	17	44	40	135	28	19	841	-533	-3
172	Actual	4739	560	71	8	31	22	64	45	256	30	162	1943		
	Limit	4739	560	71	8	31	22	64	45	256	30	121	1564	-378	-3
173	Actual	3806	1198	26	8	47	47	42	111	214	65	58	1919		
	Limit	3806	1198	26	8	47	47	42	71	214	65	58	1744	-176	-2
174	Actual	3713	659	19	3	42	27	28	53	158	26	129	2778		
	Limit	3713	659	19	3	42	27	28	53	158	26	90	2435	-342	-2
175	Actual	6252	1631	14	4	83	108	32	83	361	113	153	1212		
	Limit	6252	1631	14	4	83	108	32	83	353	113	122	1175	-37	-2
176	Actual	3532	800	3	1	68	23	110	46	109	33	5	444		
	Limit	3532	800	3	1	68	23	67	46	109	33	5	336	-107	-2
177	Actual	1922	439	0	0	125	25	16	190	53	18	137	216		
	Limit	1922	439	0	0	125	25	16	152	53	18	137	192	-24	-2
178	Actual	3682	630	93	16	86	57	119	2	197	63	59	961		
	Limit	3682	630	80	16	86	57	85	2	197	63	59	882	-80	-2
179	Actual	2465	213	3	0	229	15	24	13	118	7	43	35		
	Limit	2465	213	3	0	176	15	24	13	118	7	43	0	-35	-2
180	Actual	2779	813	99	29	29	53	52	98	107	53	51	952		
	Limit	2779	813	52	12	29	53	52	70	107	53	51	841	-111	-2
181	Actual	2467	728	27	8	113	61	50	29	136	39	111	331		
	Limit	2467	728	27	5	113	61	50	29	136	39	77	305	-26	-2
182	Actual	4545	664	9	1	107	41	35	89	219	66	37	2677		
	Limit	4545	664	9	1	107	41	35	56	219	66	37	2447	-230	-2

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183	Actual	5241	1797	25	9	65	33	16	22	233	108	75	1159		
	Limit	5241	1410	25	9	65	33	16	22	233	108	75	1109	-51	-2
184	Actual	4156	1440	89	31	94	48	67	71	163	153	21	16337		
	Limit	4156	1364	71	28	94	48	62	71	163	134	21	15610	-727	-2
185	Actual	3434	639	69	13	63	55	24	50	186	92	104	2502		
	Limit	3434	639	53	12	63	48	24	50	186	88	85	2230	-272	-2
186	Actual	3559	481	35	5	86	41	105	45	207	55	47	1215		
	Limit	3559	481	35	5	86	41	74	45	207	55	47	1113	-102	-2
187	Actual	5228	1808	25	9	47	93	46	20	212	132	61	3108		
	Limit	5228	1596	25	9	47	90	46	20	212	119	61	2967	-141	-2
188	Actual	5499	1507	3	1	120	53	21	11	261	129	96	667		
	Limit	5423	1340	3	1	120	53	21	11	261	125	93	643	-24	-2
189	Actual	2555	841	7	2	46	79	18	24	133	121	59	522		
	Limit	2555	841	7	2	46	70	18	24	133	100	59	474	-48	-2
190	Actual	5386	2638	73	36	94	120	54	47	251	134	98	4788		
	Limit	5386	2415	73	36	94	114	54	47	251	134	98	4660	-128	-2
191	Actual	3812	1242	325	106	116	86	61	36	223	121	120	944		
	Limit	3812	1242	146	34	116	86	61	36	223	121	120	904	-41	-2
192	Actual	3652	706	36	7	75	122	32	6	161	70	73	861		
	Limit	3652	706	36	7	75	93	32	6	161	70	73	829	-32	-2
193	Actual	5174	652	111	14	222	35	32	82	72	43	141	1041		
	Limit	5174	652	111	14	196	35	32	82	72	43	141	1003	-38	-2
194	Actual	3432	844	8	2	144	128	77	0	196	88	74	404		
	Limit	3432	844	8	2	144	101	77	0	196	88	74	386	-18	-2
195	Actual	3482	795	218	50	37	32	29	48	105	10	117	375		
	Limit	3482	795	49	10	37	32	29	48	105	10	114	349	-26	-2

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196	Actual	5089	700	8	1	69	26	22	43	271	39	89	2604		
	Limit	5089	700	8	1	69	26	22	43	247	39	89	2392	-212	-2
197	Actual	5699	790	4	1	61	40	34	75	253	81	150	1698		
	Limit	5699	790	4	1	61	40	34	75	253	81	125	1650	-48	-2
198	Actual	3927	784	19	4	210	69	25	50	178	73	78	742		
	Limit	3927	784	19	4	184	69	25	50	178	73	78	705	-37	-2
199	Actual	8760	2805	90	29	142	97	134	108	394	220	232	2053		
	Limit	8760	2805	90	29	142	97	111	108	394	220	232	2023	-30	-1
200	Actual	4267	667	47	7	84	30	32	34	221	80	90	3488		
	Limit	4132	667	47	7	84	30	32	34	211	80	88	3258	-230	-1
201	Actual	4638	981	30	6	129	37	27	60	162	98	65	4432		
	Limit	4638	981	30	6	107	37	27	60	162	98	65	4195	-238	-1
202	Actual	3554	2059	0	0	18	25	9	14	211	203	48	88		
	Limit	3554	2055	0	0	18	25	9	14	211	181	48	77	-11	-1
203	Actual	1304	405	7	2	99	18	3	122	51	18	57	219		
	Limit	1304	405	7	2	99	18	3	97	51	18	57	185	-33	-1
204	Actual	3539	655	14	3	199	81	4	44	180	93	87	2795		
	Limit	3539	655	14	3	178	81	4	44	180	93	87	2686	-109	-1
205	Actual	2432	663	22	6	147	35	23	19	64	35	149	438		
	Limit	2432	663	22	6	144	35	23	19	64	35	129	376	-62	-1
206	Actual	6005	1493	11	3	95	81	121	123	256	158	155	1928		
	Limit	6005	1493	11	3	95	81	101	123	256	158	155	1901	-27	-1
207	Actual	2269	494	4	1	49	39	31	37	97	60	113	138		
	Limit	2269	494	4	1	49	39	31	37	97	60	92	116	-22	-1
208	Actual	4418	832	144	27	67	28	22	37	259	86	87	2775		
	Limit	4418	832	70	16	67	28	22	37	249	86	87	2636	-139	-1

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209	Actual	5697	1006	17	3	97	97	32	125	232	67	93	1120		
	Limit	5697	1006	17	3	97	97	32	107	232	67	93	1092	-28	-1
210	Actual	4335	1517	10	3	63	42	14	32	232	206	46	385		
	Limit	4335	1517	10	3	63	42	14	32	232	188	46	376	-8	-1
211	Actual	3313	1321	54	21	57	92	59	46	140	94	51	414		
	Limit	3313	1197	40	7	57	92	59	46	140	94	51	399	-15	-1
212	Actual	3424	1349	182	72	68	72	27	84	317	94	31	756		
	Limit	3424	1349	84	17	68	72	27	84	317	94	31	741	-15	-1
213	Actual	4513	743	24	4	145	38	84	46	172	45	110	2160		
	Limit	4513	743	24	4	145	38	67	46	172	45	110	2098	-62	-1
214	Actual	6150	2669	51	22	112	107	52	8	330	132	88	2980		
	Limit	6150	2342	51	22	112	107	52	8	330	132	88	2923	-57	-1
215	Actual	4411	1288	40	12	86	36	15	40	170	134	84	3507		
	Limit	4411	1288	40	12	86	36	15	40	170	118	84	3367	-140	-1
216	Actual	2094	626	0	0	30	52	16	62	107	35	32	252		
	Limit	2094	626	0	0	30	43	16	47	107	35	32	0	-252	-1
217	Actual	6193	2213	44	16	106	115	39	11	305	92	164	1763		
	Limit	6193	2156	44	16	106	115	39	11	305	92	154	1737	-26	-1
218	Actual	3227	968	11	3	40	33	23	44	172	65	74	2955		
	Limit	3227	792	11	3	40	33	23	44	172	65	74	2735	-220	-1
219	Actual	6269	1010	3	1	176	86	46	79	235	109	89	2357		
	Limit	6269	1010	3	1	161	86	46	79	235	109	89	2327	-30	-1
220	Actual	4597	1892	5	2	59	104	20	85	181	142	32	1780		
	Limit	4597	1800	5	2	59	97	20	85	181	142	32	1744	-36	-1
221	Actual	4144	797	57	11	70	52	79	62	224	84	95	1863		
	Limit	4144	797	57	11	70	52	66	62	224	84	95	1819	-44	-1

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222	Actual	2910	666	88	20	12	29	68	45	135	23	29	319		
	Limit	2910	666	43	9	12	29	59	45	135	23	29	272	-46	-1
223	Actual	4872	1284	51	13	57	33	32	100	155	80	56	1269		
	Limit	4872	1284	51	13	57	33	32	86	155	80	56	1164	-105	-1
224	Actual	2530	831	60	20	189	97	28	23	192	56	96	579		
	Limit	2530	831	60	20	173	97	28	23	192	56	96	556	-22	-1
225	Actual	1293	704	6	3	126	35	63	72	39	50	45	69		
	Limit	1293	704	6	3	104	35	55	72	39	50	45	0	-69	-1
226	Actual	2014	254	13	2	40	20	23	116	121	24	73	169		
	Limit	2014	254	13	2	40	20	23	102	121	24	73	143	-27	-1
227	Actual	4633	1054	15	3	142	50	20	87	268	91	50	1063		
	Limit	4633	1054	15	3	142	50	20	87	256	91	50	1053	-11	-1
228	Actual	5748	1319	16	4	62	26	79	12	266	189	46	815		
	Limit	5748	1319	16	4	62	26	79	12	266	178	46	805	-10	-1
229	Actual	4613	521	14	2	142	20	102	64	256	10	86	705		
	Limit	4613	521	14	2	142	20	90	64	256	10	86	688	-17	-1
230	Actual	11101	2940	101	27	59	63	86	106	471	178	111	1562		
	Limit	11101	2813	101	27	59	63	86	106	471	178	111	1553	-9	-1
231	Actual	2523	579	65	15	111	13	21	38	97	56	42	591		
	Limit	2523	579	65	15	98	13	21	38	97	56	42	454	-137	-1
232	Actual	3138	1267	1	0	30	9	5	11	165	135	35	519		
	Limit	3138	1267	1	0	30	9	5	11	165	124	35	495	-24	-1
233	Actual	5147	1125	160	35	80	71	62	71	289	98	94	2455		
	Limit	5147	1125	75	17	80	71	62	71	289	98	94	2413	-42	-1
234	Actual	4928	816	7	1	30	73	34	43	242	80	44	2999		
	Limit	4928	816	7	1	30	64	34	43	242	80	44	2932	-67	-1

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235	Actual	5084	547	49	5	90	34	44	104	233	52	86	977		
	Limit	5084	547	49	5	90	34	44	94	233	52	86	960	-17	-1
236	Actual	3696	788	39	8	49	27	45	80	234	55	49	1455		
	Limit	3696	788	39	8	49	27	45	71	234	55	49	1409	-46	-1
237	Actual	6994	2506	29	10	245	136	62	70	280	178	177	1280		
	Limit	6994	2506	29	10	235	136	62	70	280	178	177	1271	-9	-1
238	Actual	4488	1201	194	52	148	46	55	50	107	107	97	2305		
	Limit	4488	1201	131	31	148	46	55	50	107	107	97	2255	-50	-1
239	Actual	6723	1905	162	46	143	79	29	0	265	103	96	654		
	Limit	6723	1905	108	24	143	79	29	0	265	103	96	645	-9	-0
240	Actual	1844	713	92	35	58	55	23	10	69	20	19	223		
	Limit	1844	713	42	8	58	55	23	10	69	20	19	203	-20	-0
241	Actual	2465	574	103	24	66	34	10	20	168	54	73	164		
	Limit	2465	574	51	10	66	34	10	20	168	54	73	160	-4	-0
242	Actual	5656	868	80	12	151	36	69	46	269	83	110	6143		
	Limit	5656	868	80	12	144	36	69	46	269	83	110	6072	-70	-0
243	Actual	6195	1132	34	6	187	20	62	53	188	48	145	671		
	Limit	6195	1132	34	6	187	20	62	53	188	48	138	667	-5	-0
244	Actual	8966	834	146	14	44	55	82	101	339	75	106	4616		
	Limit	8923	834	137	14	44	55	82	101	339	75	106	4593	-23	-0
245	Actual	3334	675	18	4	94	29	84	46	212	20	19	441		
	Limit	3334	675	18	4	94	29	78	46	212	20	19	431	-10	-0
246	Actual	3658	1003	82	22	5	40	43	53	145	50	50	1374		
	Limit	3658	972	53	12	5	40	43	53	145	50	50	1328	-46	-0
247	Actual	5145	1275	101	25	104	40	39	54	251	131	46	3565		
	Limit	5145	1275	52	19	104	40	39	54	251	131	46	3538	-27	-0

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248	Actual	4886	1562	33	11	119	68	19	25	177	63	71	2083		
	Limit	4886	1479	33	11	119	68	19	25	177	63	71	2064	-19	-0
249	Actual	3838	1054	11	3	78	93	36	3	144	111	116	581		
	Limit	3838	1054	11	3	78	93	36	3	144	111	110	576	-5	-0
250	Actual	2165	1114	10	5	57	46	53	51	68	30	39	311		
	Limit	2165	1114	10	5	57	46	46	51	68	30	39	267	-44	-0
251	Actual	7603	1373	7	1	146	24	109	42	464	51	51	439		
	Limit	7603	1373	7	1	146	24	103	42	464	51	51	438	-1	-0
252	Actual	2797	1754	11	7	75	69	32	0	119	151	43	609		
	Limit	2797	1641	11	7	75	69	32	0	119	150	43	592	-17	-0
253	Actual	3302	834	10	2	62	81	40	4	167	71	31	606		
	Limit	3302	834	10	2	62	75	40	4	167	71	31	596	-10	-0
254	Actual	2301	850	17	6	42	54	32	44	99	82	45	356		
	Limit	2301	850	17	6	42	54	32	44	99	77	45	333	-23	-0
255	Actual	5398	1893	19	6	100	33	26	38	322	44	93	1339		
	Limit	5398	1820	19	6	100	33	26	38	322	44	93	1328	-11	-0
256	Actual	2648	377	95	14	132	27	48	41	150	43	37	706		
	Limit	2648	377	61	14	132	27	48	41	150	43	37	696	-10	-0
257	Actual	5440	724	0	0	4	12	2	7	254	57	14	142		
	Limit	5390	724	0	0	4	12	2	7	254	57	14	139	-2	-0
258	Actual	3765	700	83	16	129	40	17	30	176	57	62	2611		
	Limit	3765	700	58	12	129	40	17	30	176	57	62	2581	-30	-0
259	Actual	4268	1580	17	6	74	80	36	9	197	121	41	835		
	Limit	4268	1535	17	6	74	80	36	9	197	121	41	828	-7	-0
260	Actual	3971	655	80	13	198	51	23	46	170	36	72	294		
	Limit	3971	655	47	9	198	51	23	46	170	36	72	292	-2	-0

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261	Actual	2979	1433	33	16	23	44	31	43	186	85	38	1068		
	Limit	2979	1393	33	16	23	44	31	43	186	85	38	1053	-15	-0
262	Actual	1961	964	15	7	100	50	67	64	23	18	39	94		
	Limit	1961	964	15	7	100	50	63	64	23	18	39	84	-9	-0
263	Actual	4412	916	78	16	41	19	32	31	147	36	51	537		
	Limit	4412	916	51	11	41	19	32	31	147	36	51	524	-13	-0
264	Actual	4377	1788	24	10	106	70	22	41	120	95	41	431		
	Limit	4377	1758	24	10	106	70	22	41	120	95	41	427	-4	-0
265	Actual	5361	96	105	2	113	11	59	9	408	8	44	142		
	Limit	5361	96	83	2	113	11	59	9	408	8	44	142	-1	-0
266	Actual	2948	244	52	4	138	27	92	32	128	24	79	545		
	Limit	2948	244	52	4	138	27	90	32	128	24	79	539	-6	-0
267	Actual	2205	733	55	18	27	67	43	81	89	50	32	364		
	Limit	2205	733	44	9	27	67	43	81	89	50	32	360	-4	-0
268	Actual	3517	1589	11	5	255	83	39	28	187	121	90	675		
	Limit	3517	1579	11	5	255	83	39	28	187	121	90	674	-1	-0
269	Actual	7772	2687	0	0	122	173	62	25	426	183	78	633		
	Limit	7772	2668	0	0	122	173	62	25	426	183	78	632	-1	-0
270	Actual	3164	481	18	3	33	14	60	44	132	36	66	322		
	Limit	3164	481	18	3	33	14	60	44	132	36	64	309	-13	-0
271	Actual	2956	1441	23	11	73	91	27	29	134	115	79	458		
	Limit	2956	1431	23	11	73	91	27	29	134	115	79	456	-1	-0
272	Actual	4865	986	25	5	55	55	31	25	205	95	124	840		
	Limit	4865	986	25	5	55	55	31	25	205	95	122	839	-1	-0
273	Actual	4630	985	63	13	65	38	32	43	275	90	109	1620		
	Limit	4630	985	63	13	65	38	32	43	274	90	109	1615	-5	-0

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274	Actual	2091	1247	27	16	55	102	20	105	91	122	0	426		
	Limit	2091	1247	27	11	55	102	20	105	91	122	0	425	-1	-0
275	Actual	3236	1136	113	40	90	78	16	38	174	102	76	807		
	Limit	3236	1136	113	32	90	78	16	38	174	102	76	804	-3	-0
276	Actual	6607	1665	131	33	62	44	46	63	374	108	33	2634		
	Limit	6607	1665	125	30	62	44	46	63	374	108	33	2631	-3	-0
277	Actual	3691	1076	101	29	164	58	28	49	114	37	111	1496		
	Limit	3691	1076	101	24	164	58	28	49	114	37	111	1492	-3	-0
278	Actual	3840	579	57	9	62	45	14	92	133	38	82	991		
	Limit	3840	579	48	9	62	45	14	92	133	38	82	988	-3	-0
279	Actual	3578	736	124	26	113	32	24	38	163	49	89	3724		
	Limit	3578	736	115	26	113	32	24	38	163	49	89	3716	-8	-0
280	Actual	4954	1141	32	7	195	94	67	67	256	98	97	3511		
	Limit	4954	1141	32	7	194	94	67	67	256	98	97	3507	-4	-0
281	Actual	2573	770	41	12	37	41	20	64	132	33	74	13		
	Limit	2573	683	41	8	37	40	20	64	132	33	60	0	-13	-0
282	Actual	1776	874	44	22	97	51	63	18	82	18	21	66		
	Limit	1776	874	44	14	97	51	63	18	82	18	21	62	-4	-0
283	Actual	2202	791	11	4	63	68	19	66	93	64	39	89		
	Limit	2202	791	11	4	63	66	19	66	93	64	39	87	-2	-0
284	Actual	1632	537	11	3	69	32	27	20	80	32	36	45		
	Limit	1632	537	11	3	69	32	27	20	80	32	36	45	0	0
285	Actual	3274	580	49	9	46	39	45	42	117	60	62	689		
	Limit	3274	580	49	9	46	39	45	42	117	60	62	689	0	0
286	Actual	1921	741	7	3	60	77	8	57	103	43	33	315		
	Limit	1921	741	7	3	60	77	8	57	103	43	33	315	0	0

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287	Actual	2793	440	33	5	39	21	26	64	130	26	55	312		
	Limit	2793	440	33	5	39	21	26	64	130	26	55	312	0	0
288	Actual	3646	927	9	2	133	37	37	66	164	42	45	205		
	Limit	3646	927	9	2	133	37	37	66	164	42	45	205	0	0
289	Actual	3072	249	32	3	49	37	69	57	96	6	47	68		
	Limit	3072	249	32	3	49	37	69	57	96	6	47	68	0	0
290	Actual	3442	610	5	1	72	11	35	63	153	9	48	214		
	Limit	3442	610	5	1	72	11	35	62	153	9	48	214	0	0
291	Actual	2908	708	13	3	89	76	35	85	164	47	68	399		
	Limit	2908	708	13	3	89	76	35	85	164	47	68	399	0	0
292	Actual	2677	776	32	9	61	36	40	65	128	27	51	328		
	Limit	2677	776	32	9	61	36	40	65	128	27	51	328	0	0
293	Actual	2886	764	21	5	84	33	40	39	128	51	105	1199		
	Limit	2886	764	21	5	84	33	40	39	128	51	105	1199	0	0
294	Actual	2686	614	34	8	43	20	44	58	101	25	35	459		
	Limit	2686	614	34	8	43	20	44	58	101	25	35	459	0	0
295	Actual	1555	368	14	3	75	28	20	41	91	22	49	88		
	Limit	1555	368	14	3	75	28	20	41	91	22	49	88	0	0
296	Actual	2660	611	6	1	36	41	47	16	128	50	55	197		
	Limit	2660	611	6	1	36	41	47	16	128	50	55	197	0	0
297	Actual	2255	544	22	5	60	63	19	43	133	41	34	489		
	Limit	2255	544	22	5	60	63	19	43	133	41	34	489	0	0
298	Actual	1894	479	12	3	11	53	27	5	97	26	35	18		
	Limit	1894	479	12	3	11	53	27	5	97	26	35	18	0	0
299	Actual	3372	806	11	3	102	53	45	117	119	54	151	1812		
	Limit	3372	806	11	3	102	53	45	117	119	54	150	1812	0	0

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300	Actual	3669	513	4	1	64	12	40	67	167	25	36	24		
	Limit	3669	513	4	1	64	12	40	67	167	25	36	24	0	0
301	Actual	2964	829	8	2	64	21	24	49	148	63	47	1288		
	Limit	2964	829	8	2	64	21	24	49	148	63	47	1288	0	0
302	Actual	5197	1051	11	2	26	24	13	47	127	90	40	966		
	Limit	5197	1051	11	2	26	24	13	47	127	90	40	966	0	0
303	Actual	2555	672	11	3	92	41	23	46	93	68	23	193		
	Limit	2555	672	11	3	92	41	23	46	93	68	23	193	0	0
304	Actual	3592	281	14	1	121	11	61	39	81	5	58	10		
	Limit	3592	281	14	1	121	11	61	39	81	5	58	10	0	0
305	Actual	3882	809	9	2	172	9	63	21	257	88	97	405		
	Limit	3882	809	9	2	172	9	63	21	257	88	97	405	0	0
306	Actual	2151	480	15	3	61	47	70	40	129	16	44	157		
	Limit	2151	480	15	3	61	47	70	40	129	16	44	157	0	0
307	Actual	3147	578	41	7	84	46	28	45	141	37	44	723		
	Limit	3147	578	41	7	84	46	28	45	141	37	44	723	0	0
308	Actual	2378	604	20	5	134	52	14	68	139	54	0	294		
	Limit	2378	604	20	5	134	52	14	68	139	54	0	294	0	0
309	Actual	3316	768	1	0	67	23	26	57	174	56	53	137		
	Limit	3316	768	1	0	67	23	26	57	174	56	53	137	0	0
310	Actual	2758	419	13	2	69	22	21	55	142	27	46	87		
	Limit	2758	419	13	2	69	22	21	55	142	27	46	87	0	0
311	Actual	3855	865	39	9	66	23	34	59	195	74	127	9311		
	Limit	3855	865	39	9	66	23	34	59	195	74	127	9311	0	0
312	Actual	3751	851	3	1	64	27	31	53	210	54	70	433		
	Limit	3751	851	3	1	64	27	31	53	210	54	70	433	0	0

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313	Actual	2928	487	1	0	49	11	26	48	165	17	37	0		
	Limit	2928	487	1	0	49	11	26	48	165	17	37	0	0	0
314	Actual	2875	600	4	1	45	13	24	51	167	24	37	13		
	Limit	2875	600	4	1	45	13	24	51	167	24	37	13	0	0
315	Actual	3917	587	5	1	105	41	26	64	172	30	32	259		
	Limit	3917	587	5	1	105	41	26	64	172	30	32	259	0	0
316	Actual	2159	927	4	2	30	33	15	34	88	65	34	115		
	Limit	2159	927	4	2	30	33	15	34	88	65	34	115	0	0
317	Actual	2155	578	23	6	88	54	24	43	99	76	30	559		
	Limit	2155	578	23	6	88	54	24	43	99	76	30	559	0	0
318	Actual	3597	526	13	2	86	38	21	41	183	57	58	287		
	Limit	3597	526	13	2	86	38	21	41	183	57	58	287	0	0
319	Actual	3094	667	5	1	39	17	25	50	147	38	45	1179		
	Limit	3094	667	5	1	39	17	25	50	147	38	45	1179	0	0
320	Actual	5078	1208	2	0	63	40	20	51	255	114	44	1200		
	Limit	5078	1208	2	0	63	40	20	51	255	114	44	1200	0	0
321	Actual	2351	290	6	1	54	27	25	59	88	40	26	71		
	Limit	2351	290	6	1	54	27	25	59	88	40	26	71	0	0
322	Actual	3079	1201	32	13	27	30	15	31	131	99	50	597		
	Limit	3079	1201	32	12	27	30	15	31	131	99	50	597	0	0
323	Actual	4346	1027	17	4	60	23	27	51	140	85	60	627		
	Limit	4346	1027	17	4	60	23	27	51	140	85	60	627	0	0
324	Actual	5622	442	11	1	113	36	106	91	175	31	67	443		
	Limit	5622	442	11	1	113	36	106	91	175	31	67	443	0	0
325	Actual	3949	528	40	5	89	26	59	50	57	47	123	502		
	Limit	3949	528	40	5	89	26	59	50	57	47	123	502	0	0

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326	Actual	2773	580	3	1	62	29	11	29	151	48	11	164		
	Limit	2773	580	3	1	62	29	11	29	151	48	11	164	0	0
327	Actual	3339	595	6	1	79	28	13	54	207	72	16	247		
	Limit	3339	595	6	1	79	28	13	54	207	72	16	247	0	0
328	Actual	4290	508	1	0	53	11	24	54	293	39	33	541		
	Limit	4290	508	1	0	53	11	24	54	293	39	33	541	0	0
329	Actual	3213	894	9	2	58	9	21	36	196	86	25	2524		
	Limit	3213	894	9	2	58	9	21	36	196	86	25	2524	0	0
330	Actual	2738	467	8	1	45	23	16	49	186	50	18	219		
	Limit	2738	467	8	1	45	23	16	49	186	50	18	219	0	0
331	Actual	4080	1201	34	10	40	15	10	32	145	116	25	2208		
	Limit	4080	1201	34	10	40	15	10	32	145	116	25	2208	0	0
332	Actual	2818	674	5	1	66	22	25	52	146	32	38	19		
	Limit	2818	674	5	1	66	22	25	52	146	32	38	19	0	0
333	Actual	1891	605	4	1	24	83	11	32	74	59	77	42		
	Limit	1891	605	4	1	24	83	11	32	74	59	77	42	0	0
334	Actual	2674	694	6	2	60	21	25	50	129	14	41	34		
	Limit	2674	694	6	2	60	21	25	50	129	14	41	34	0	0
335	Actual	3689	566	21	3	110	36	30	24	176	36	32	111		
	Limit	3689	566	21	3	110	36	30	24	176	36	32	111	0	0
336	Actual	2656	626	35	8	54	13	33	52	101	44	34	259		
	Limit	2656	626	35	8	54	13	33	52	101	44	34	259	0	0
337	Actual	3397	813	17	4	42	41	56	61	128	73	87	207		
	Limit	3397	813	17	4	42	41	56	61	128	73	87	207	0	0
338	Actual	2673	813	9	3	15	37	47	44	83	51	74	266		
	Limit	2673	813	9	3	15	37	47	44	83	51	74	266	0	0

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339	Actual	3388	587	4	1	17	33	41	116	168	50	85	89		
	Limit	3388	587	4	1	17	33	41	116	168	50	85	89	0	0
340	Actual	2401	742	4	1	82	64	25	10	80	53	17	62		
	Limit	2401	742	4	1	82	64	25	10	80	53	17	62	0	0
341	Actual	3939	831	17	4	68	40	15	40	154	74	29	1002		
	Limit	3939	831	17	4	68	40	15	40	154	74	29	1002	0	0
342	Actual	2462	501	2	0	61	63	31	35	75	4	21	59		
	Limit	2462	501	2	0	61	63	31	35	75	4	21	59	0	0
343	Actual	5750	808	22	3	100	60	51	25	228	84	76	1595		
	Limit	5750	808	22	3	100	60	51	25	228	84	76	1595	0	0
344	Actual	2346	386	0	0	53	12	34	48	71	49	48	35		
	Limit	2346	386	0	0	53	12	34	48	71	49	48	35	0	0
345	Actual	1427	487	18	6	98	49	44	27	59	20	63	71		
	Limit	1427	487	18	6	98	49	44	27	59	20	63	71	0	0
346	Actual	3538	898	36	9	70	35	12	35	124	53	94	1125		
	Limit	3538	898	36	9	70	35	12	35	124	53	94	1125	0	0
347	Actual	2494	679	23	6	34	20	20	37	157	81	66	757		
	Limit	2494	679	23	6	34	20	20	37	157	81	66	757	0	0
348	Actual	3786	934	0	0	41	24	18	49	149	44	45	303		
	Limit	3786	934	0	0	41	24	18	49	149	44	45	303	0	0
349	Actual	2507	585	4	1	52	18	20	46	118	35	43	7		
	Limit	2507	585	4	1	52	18	20	46	118	35	43	7	0	0
350	Actual	2379	750	7	2	66	17	27	50	122	57	33	95		
	Limit	2379	750	7	2	66	17	27	50	122	57	33	95	0	0
351	Actual	2664	664	3	1	47	14	22	48	128	33	36	22		
	Limit	2664	664	3	1	47	14	22	48	128	33	36	22	0	0

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352	Actual	2715	779	7	2	20	36	40	50	138	74	55	94		
	Limit	2715	779	7	2	20	36	40	50	138	74	55	94	0	0
353	Actual	4910	1103	5	1	33	37	32	30	230	94	49	1064		
	Limit	4910	1103	5	1	33	37	32	30	230	94	49	1064	0	0
354	Actual	2520	652	0	0	20	49	6	24	130	102	34	272		
	Limit	2520	652	0	0	20	49	6	24	130	102	34	272	0	0
355	Actual	3545	384	18	2	40	10	15	15	222	53	51	49		
	Limit	3545	384	18	2	40	10	15	15	222	53	51	49	0	0
356	Actual	2116	550	6	2	41	12	21	48	100	45	26	686		
	Limit	2116	550	6	2	41	12	21	48	100	45	26	686	0	0
357	Actual	5535	1264	8	2	32	26	13	33	284	82	60	1563		
	Limit	5535	1264	8	2	32	26	13	33	284	82	60	1563	0	0
358	Actual	2775	433	27	4	59	20	18	30	165	40	45	286		
	Limit	2775	433	27	4	59	20	18	30	165	40	45	286	0	0
359	Actual	3752	637	21	4	38	27	12	34	180	28	36	534		
	Limit	3752	637	21	4	38	27	12	34	180	28	36	534	0	0
360	Actual	3062	706	6	1	51	15	31	50	150	28	40	37		
	Limit	3062	706	6	1	51	15	31	50	150	28	40	37	0	0
361	Actual	3666	1264	12	4	60	33	23	34	152	132	93	985		
	Limit	3666	1264	12	4	60	33	23	34	152	132	93	985	0	0
362	Actual	3369	1021	5	2	73	21	8	51	155	110	44	498		
	Limit	3369	1021	5	2	73	21	8	51	155	110	44	498	0	0
363	Actual	2557	555	66	14	55	29	26	41	100	56	73	126		
	Limit	2557	555	65	14	55	29	26	41	100	56	73	126	0	0
364	Actual	2456	776	16	5	90	35	12	23	110	71	43	122		
	Limit	2456	776	16	5	90	35	12	23	110	71	43	122	0	0

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365	Actual	2953	442	22	3	103	40	27	13	111	45	12	51		
	Limit	2953	442	22	3	103	40	27	13	111	45	12	51	0	0
366	Actual	3399	883	24	6	88	62	23	11	184	77	101	582		
	Limit	3399	883	24	6	88	62	23	11	184	77	101	582	0	0
367	Actual	3021	319	15	2	111	21	25	47	137	14	62	1445		
	Limit	3021	319	15	2	111	21	25	47	137	14	62	1445	0	0
368	Actual	3877	631	3	1	49	20	14	25	201	40	78	411		
	Limit	3877	631	3	1	49	20	14	25	201	40	78	411	0	0
369	Actual	2203	177	13	1	68	17	44	72	87	12	40	49		
	Limit	2203	177	13	1	68	17	44	72	87	12	40	49	0	0
370	Actual	3123	790	39	10	91	24	29	36	147	74	73	578		
	Limit	3123	790	39	10	91	24	29	36	147	74	73	578	0	0
371	Actual	2496	575	13	3	63	69	17	10	145	43	55	37		
	Limit	2496	575	13	3	63	69	17	10	145	43	55	37	0	0
372	Actual	3028	757	4	1	46	10	7	19	108	67	34	162		
	Limit	3028	757	4	1	46	10	7	19	108	67	34	162	0	0
373	Actual	4751	1802	24	9	58	49	28	26	191	99	43	274		
	Limit	4751	1802	24	9	58	49	28	26	191	99	43	274	0	0
374	Actual	4643	578	24	3	61	10	22	52	218	51	62	897		
	Limit	4643	578	24	3	61	10	22	52	218	51	62	897	0	0
375	Actual	2930	1728	5	3	33	33	16	24	177	67	82	159		
	Limit	2930	1728	5	3	33	33	16	24	177	67	82	159	0	0
376	Actual	2726	560	0	0	50	7	29	28	137	59	58	90		
	Limit	2726	560	0	0	50	7	29	28	137	59	58	90	0	0
377	Actual	4988	941	37	7	83	45	6	12	249	52	23	221		
	Limit	4988	941	37	7	83	45	6	12	249	52	23	221	0	0

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378	Actual	4810	824	8	1	114	24	47	36	156	72	96	402		
	Limit	4810	824	8	1	114	24	47	36	156	72	96	402	0	0
379	Actual	2028	1175	15	9	103	28	10	17	127	124	39	120		
	Limit	2028	1175	15	9	103	28	10	17	127	124	39	120	0	0
380	Actual	3825	1515	4	2	53	57	43	53	215	106	48	541		
	Limit	3825	1515	4	2	53	57	43	53	215	106	48	541	0	0
381	Actual	3262	623	14	3	134	17	14	16	149	66	14	391		
	Limit	3262	623	14	3	134	17	14	16	149	66	14	391	0	0
382	Actual	4743	1580	28	9	30	92	24	15	218	109	52	467		
	Limit	4743	1580	28	9	30	92	24	15	218	109	52	467	0	0
383	Actual	3096	822	45	12	54	12	5	17	109	52	50	190		
	Limit	3096	822	45	12	54	12	5	17	109	52	50	190	0	0
384	Actual	3677	845	16	4	76	30	8	15	135	56	25	117		
	Limit	3677	845	16	4	76	30	8	15	135	56	25	117	0	0
385	Actual	2648	925	35	12	41	12	9	8	97	107	31	56		
	Limit	2648	925	35	11	41	12	9	8	97	107	31	56	0	0
386	Actual	2713	1120	16	7	52	48	31	11	80	69	53	577		
	Limit	2713	1120	16	7	52	48	31	11	80	69	53	577	0	0
387	Actual	4808	1051	14	3	171	25	32	27	195	119	38	323		
	Limit	4808	1051	14	3	171	25	32	27	195	119	38	323	0	0
388	Actual	4052	488	6	1	47	55	20	22	191	63	59	264		
	Limit	4052	488	6	1	47	55	20	22	191	63	59	264	0	0
389	Actual	2925	386	71	9	107	41	21	34	141	70	71	106		
	Limit	2925	386	71	9	107	41	21	34	141	70	71	106	0	0
390	Actual	4284	560	18	2	88	27	11	15	145	42	28	140		
	Limit	4284	560	18	2	88	27	11	15	145	42	28	140	0	0

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391	Actual	3434	573	20	3	47	33	13	3	169	76	45	548		
	Limit	3434	573	20	3	47	33	13	3	169	76	45	548	0	0
392	Actual	2364	647	37	10	38	22	16	67	110	55	45	678		
	Limit	2364	647	37	10	38	22	16	67	110	55	45	678	0	0
393	Actual	3875	560	13	2	77	40	29	11	154	33	52	549		
	Limit	3875	560	13	2	77	40	29	11	154	33	52	549	0	0
394	Actual	3233	668	19	4	57	6	27	45	140	50	35	912		
	Limit	3233	668	19	4	57	6	27	45	140	50	35	912	0	0
395	Actual	4060	1262	7	2	75	20	12	40	200	43	19	32		
	Limit	4060	1262	7	2	75	20	12	40	200	43	19	32	0	0
396	Actual	1812	619	20	7	153	46	42	26	89	64	23	344		
	Limit	1812	619	20	7	153	46	42	26	89	64	23	344	0	0
397	Actual	3124	554	19	3	61	10	55	22	173	39	44	639		
	Limit	3124	554	19	3	61	10	55	22	173	39	44	639	0	0
398	Actual	6374	913	21	3	118	82	25	24	314	56	86	722		
	Limit	6374	913	21	3	118	82	25	24	314	56	86	722	0	0
399	Actual	2892	1361	0	0	52	56	20	87	132	125	51	58		
	Limit	2892	1361	0	0	52	56	20	87	132	125	51	58	0	0
400	Actual	3091	674	15	3	58	34	23	54	105	41	60	920		
	Limit	3091	674	15	3	58	34	23	54	105	41	60	920	0	0
401	Actual	4950	1164	28	6	49	50	49	44	218	67	33	578		
	Limit	4950	1164	28	6	49	50	49	44	218	67	33	578	0	0
402	Actual	2797	632	33	8	60	19	20	12	103	51	27	184		
	Limit	2797	632	33	8	60	19	20	12	103	51	27	184	0	0
403	Actual	4744	1418	6	2	69	3	42	4	127	55	20	161		
	Limit	4744	1418	6	2	69	3	42	4	127	55	20	161	0	0

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404	Actual	3798	520	28	4	33	49	11	18	250	43	23	230		
	Limit	3798	520	28	4	33	49	11	18	250	43	23	230	0	0
405	Actual	4198	461	26	3	91	3	29	11	285	8	28	206		
	Limit	4198	461	26	3	91	3	29	11	285	8	28	206	0	0
406	Actual	2902	1019	24	8	46	15	20	33	151	70	31	15		
	Limit	2902	1019	24	8	46	15	20	33	151	70	31	15	0	0
407	Actual	4783	796	21	4	30	39	53	0	287	56	32	507		
	Limit	4783	796	21	4	30	39	53	0	287	56	32	507	0	0
408	Actual	4554	588	30	4	62	3	16	18	211	41	27	424		
	Limit	4554	588	30	4	62	3	16	18	211	41	27	424	0	0
409	Actual	5296	1127	21	4	164	123	15	13	191	95	60	820		
	Limit	5296	1127	21	4	164	123	15	13	191	95	60	820	0	0
410	Actual	3563	125	2	0	36	5	0	50	138	7	11	139		
	Limit	3563	125	2	0	36	5	0	50	138	7	11	139	0	0
411	Actual	8390	1500	51	9	114	69	5	71	278	69	0	141		
	Limit	8390	1500	51	9	114	69	5	71	278	69	0	141	0	0
412	Actual	7796	1248	14	2	68	59	16	55	243	93	134	842		
	Limit	7796	1248	14	2	68	59	16	55	243	93	134	842	0	0
413	Actual	7736	642	43	4	86	27	14	24	387	79	49	783		
	Limit	7736	642	43	4	86	27	14	24	387	79	49	783	0	0
414	Actual	7546	1355	63	11	80	77	4	54	426	57	0	691		
	Limit	7546	1355	63	11	80	77	4	54	426	57	0	691	0	0
415	Actual	3924	726	34	6	92	73	19	56	187	62	58	729		
	Limit	3924	726	34	6	92	73	19	56	187	62	58	729	0	0
416	Actual	3108	1087	11	4	96	72	25	10	161	101	69	360		
	Limit	3108	1087	11	4	96	72	25	10	161	101	69	360	0	0

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417	Actual	5033	1292	18	5	43	84	33	29	182	73	60	245		
	Limit	5033	1292	18	5	43	84	33	29	182	73	60	245	0	0
418	Actual	2787	343	8	1	68	20	11	9	81	34	39	137		
	Limit	2787	343	8	1	68	20	11	9	81	34	39	137	0	0
419	Actual	3777	521	20	3	63	27	19	26	143	34	62	350		
	Limit	3777	521	20	3	63	27	19	26	143	34	62	350	0	0
420	Actual	4057	512	3	0	68	18	11	18	174	51	33	765		
	Limit	4057	512	3	0	68	18	11	18	174	51	33	765	0	0
421	Actual	2626	289	51	6	73	8	65	51	85	17	54	301		
	Limit	2626	289	51	6	73	8	65	51	85	17	54	301	0	0
422	Actual	5014	1105	1	0	59	94	66	61	244	98	81	833		
	Limit	5014	1105	1	0	59	94	66	61	244	98	81	833	0	0
423	Actual	4236	1079	4	1	115	91	11	52	89	74	40	996		
	Limit	4236	1079	4	1	115	91	11	52	89	74	40	996	0	0
424	Actual	6182	1873	0	0	114	145	45	16	294	153	83	980		
	Limit	6182	1873	0	0	114	145	45	16	294	153	83	980	0	0
425	Actual	3356	765	8	2	70	40	21	35	97	75	38	618		
	Limit	3356	765	8	2	70	40	21	35	97	75	38	618	0	0
426	Actual	5732	1112	72	14	71	55	26	12	361	132	67	3530		
	Limit	5732	1112	72	14	71	55	26	12	361	132	67	3530	0	0
427	Actual	6510	1267	71	14	79	47	65	85	292	99	131	3801		
	Limit	6510	1267	71	14	79	47	65	85	292	99	131	3801	0	0
428	Actual	5011	1218	26	6	101	42	40	33	246	99	104	1964		
	Limit	5011	1218	26	6	101	42	40	33	246	99	104	1964	0	0
429	Actual	5121	890	19	3	96	51	53	6	184	70	115	3067		
	Limit	5121	890	19	3	96	51	53	6	184	70	115	3067	0	0

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430	Actual	3630	675	6	1	97	40	39	33	61	56	63	245		
	Limit	3630	675	6	1	97	40	39	33	61	56	63	245	0	0
431	Actual	5107	601	70	8	93	21	21	39	242	42	75	1186		
	Limit	5107	601	70	8	93	21	21	39	242	42	75	1186	0	0
432	Actual	3886	738	25	5	85	44	9	20	156	66	30	623		
	Limit	3886	738	25	5	85	44	9	20	156	66	30	623	0	0
433	Actual	3656	736	64	13	63	38	24	6	140	42	53	653		
	Limit	3656	736	64	13	63	38	24	6	140	42	53	653	0	0
434	Actual	5514	1897	8	3	99	50	26	53	143	86	112	1125		
	Limit	5514	1897	8	3	99	50	26	53	143	86	112	1125	0	0
435	Actual	2532	1021	8	3	81	34	49	53	118	10	22	20		
	Limit	2532	1021	8	3	81	34	49	53	118	10	22	20	0	0
436	Actual	3887	1089	4	1	72	24	19	27	153	73	54	2076		
	Limit	3887	1089	4	1	72	24	19	27	153	73	54	2076	0	0
437	Actual	3648	814	42	9	41	20	18	35	155	62	36	971		
	Limit	3648	814	42	9	41	20	18	35	155	62	36	971	0	0
438	Actual	5092	737	14	2	71	15	6	9	226	64	48	1144		
	Limit	5092	737	14	2	71	15	6	9	226	64	48	1144	0	0
439	Actual	6153	656	14	2	92	12	47	36	248	55	58	608		
	Limit	6153	656	14	2	92	12	47	36	248	55	58	608	0	0
440	Actual	4393	1220	5	1	31	36	30	26	256	53	58	992		
	Limit	4393	1220	5	1	31	36	30	26	256	53	58	992	0	0
441	Actual	3930	849	3	1	103	11	15	19	250	54	67	71		
	Limit	3930	849	3	1	103	11	15	19	250	54	67	71	0	0
442	Actual	5210	892	14	2	52	36	11	25	287	69	48	2704		
	Limit	5210	892	14	2	52	36	11	25	287	69	48	2704	0	0

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443	Actual	5586	1150	8	2	98	50	20	15	391	120	82	2083		
	Limit	5586	1150	8	2	98	50	20	15	391	120	82	2083	0	0
444	Actual	4253	730	31	5	63	15	18	29	230	72	59	2809		
	Limit	4253	730	31	5	63	15	18	29	230	72	59	2809	0	0
445	Actual	4051	346	12	1	79	23	27	32	243	30	98	637		
	Limit	4051	346	12	1	79	23	27	32	243	30	98	637	0	0
446	Actual	3180	470	12	2	45	12	22	43	171	21	37	35		
	Limit	3180	470	12	2	45	12	22	43	171	21	37	35	0	0
447	Actual	3251	960	24	7	42	42	37	42	209	83	124	2144		
	Limit	3251	960	24	7	42	42	37	42	209	83	124	2144	0	0
448	Actual	6223	409	0	0	261	19	70	17	311	49	0	105		
	Limit	6223	409	0	0	261	19	70	17	311	49	0	105	0	0
449	Actual	8758	1603	42	8	362	106	106	22	563	143	43	465		
	Limit	8758	1603	42	8	362	106	106	22	563	143	43	465	0	0
450	Actual	6365	1311	20	4	63	66	57	46	357	144	75	2703		
	Limit	6365	1311	20	4	63	66	57	46	357	144	75	2703	0	0
451	Actual	3969	692	6	1	60	29	38	45	164	40	106	267		
	Limit	3969	692	6	1	60	29	38	45	164	40	106	267	0	0
452	Actual	4301	1343	38	12	75	52	17	52	125	74	84	460		
	Limit	4301	1343	38	12	75	52	17	52	125	74	84	460	0	0
453	Actual	5880	806	61	8	92	22	48	38	331	42	93	425		
	Limit	5880	806	61	8	92	22	48	38	331	42	93	425	0	0
454	Actual	4096	649	72	11	72	33	32	25	231	115	55	857		
	Limit	4096	649	72	11	72	33	32	25	231	115	55	857	0	0
455	Actual	4125	1450	6	2	57	115	15	26	236	111	126	883		
	Limit	4125	1450	6	2	57	115	15	26	236	111	126	883	0	0

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456	Actual	2070	644	7	2	59	44	32	14	119	26	93	158		
	Limit	2070	644	7	2	59	44	32	14	119	26	93	158	0	0
457	Actual	2346	10	0	0	69	2	56	16	41	1	39	94		
	Limit	2346	10	0	0	69	2	56	16	41	1	39	94	0	0
458	Actual	6518	763	27	3	93	20	43	48	351	55	142	823		
	Limit	6518	763	27	3	93	20	43	48	351	55	142	823	0	0
459	Actual	2757	317	0	0	39	7	12	11	115	19	19	18		
	Limit	2757	317	0	0	39	7	12	11	115	19	19	18	0	0
460	Actual	6719	1349	7	1	67	108	38	16	336	136	28	405		
	Limit	6719	1349	7	1	67	108	38	16	336	136	28	405	0	0
461	Actual	2405	478	6	1	62	48	15	41	93	45	95	614		
	Limit	2405	478	6	1	62	48	15	41	93	45	95	614	0	0
462	Actual	4726	913	0	0	68	44	11	20	186	83	50	794		
	Limit	4726	913	0	0	68	44	11	20	186	83	50	794	0	0
463	Actual	5456	801	0	0	64	44	9	18	232	73	34	886		
	Limit	5456	801	0	0	64	44	9	18	232	73	34	886	0	0
464	Actual	4808	614	10	1	77	18	10	30	180	49	81	2475		
	Limit	4808	614	10	1	77	18	10	30	180	49	81	2475	0	0
465	Actual	5949	1618	63	17	106	55	47	64	220	139	98	1986		
	Limit	5949	1618	63	17	106	55	47	64	220	139	98	1986	0	0
466	Actual	4044	477	34	4	30	21	25	37	160	46	70	799		
	Limit	4044	477	34	4	30	21	25	37	160	46	70	799	0	0
467	Actual	3208	503	15	2	21	38	90	6	136	51	46	237		
	Limit	3208	503	15	2	21	38	90	6	136	51	46	237	0	0
468	Actual	1728	212	6	1	165	63	59	24	70	48	46	125		
	Limit	1728	212	6	1	165	63	59	24	70	48	46	125	0	0

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469	Actual	5045	1042	31	6	91	43	13	21	245	127	69	2548		
	Limit	5045	1042	31	6	91	43	13	21	245	127	69	2548	0	0
470	Actual	2061	587	4	1	86	36	16	26	67	52	0	53		
	Limit	2061	587	4	1	86	36	16	26	67	52	0	53	0	0
471	Actual	3976	636	14	2	66	23	7	16	170	57	34	813		
	Limit	3976	636	14	2	66	23	7	16	170	57	34	813	0	0
472	Actual	3817	903	6	2	78	29	20	49	161	31	41	118		
	Limit	3817	903	6	2	78	29	20	49	161	31	41	118	0	0
473	Actual	5435	909	13	2	158	19	11	76	236	49	47	776		
	Limit	5435	909	13	2	158	19	11	76	236	49	47	776	0	0
474	Actual	3394	383	5	1	71	6	59	84	149	15	80	223		
	Limit	3394	383	5	1	71	6	59	84	149	15	80	223	0	0
475	Actual	3944	990	17	4	97	32	30	48	167	56	42	2317		
	Limit	3944	990	17	4	97	32	30	48	167	56	42	2317	0	0
476	Actual	3123	669	8	2	75	14	23	49	153	48	38	274		
	Limit	3123	669	8	2	75	14	23	49	153	48	38	274	0	0
477	Actual	4191	756	3	1	65	19	20	57	232	54	28	230		
	Limit	4191	756	3	1	65	19	20	57	232	54	28	230	0	0
478	Actual	4540	245	15	1	115	11	41	11	221	13	15	166		
	Limit	4540	245	15	1	115	11	41	11	221	13	15	166	0	0
479	Actual	1526	998	11	7	60	24	51	49	102	86	15	127		
	Limit	1526	998	11	7	60	24	51	49	102	86	15	127	0	0
480	Actual	3048	66	23	1	69	9	23	35	160	3	72	153		
	Limit	3048	66	23	1	69	9	23	35	160	3	72	153	0	0
481	Actual	1871	768	10	4	123	49	17	18	50	14	43	22		
	Limit	1871	768	10	4	123	49	17	18	50	14	43	22	0	0

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482	Actual	4924	566	37	4	102	15	13	41	215	35	121	659		
	Limit	4924	566	37	4	102	15	13	41	215	35	121	659	0	0
483	Actual	3377	696	1	0	67	16	15	50	172	66	26	53		
	Limit	3377	696	1	0	67	16	15	50	172	66	26	53	0	0
484	Actual	5418	1174	2	0	191	69	46	50	111	100	59	269		
	Limit	5418	1174	2	0	191	69	46	50	111	100	59	269	0	0
485	Actual	2956	481	96	16	80	26	21	21	87	21	105	377		
	Limit	2956	481	96	16	80	26	21	21	87	21	105	377	0	0
486	Actual	3304	643	39	8	65	23	40	40	135	38	91	595		
	Limit	3304	643	39	8	65	23	40	40	135	38	91	595	0	0
487	Actual	4479	1022	64	15	127	91	42	33	90	33	137	504		
	Limit	4479	1022	64	15	127	91	42	33	90	33	137	504	0	0
488	Actual	4834	852	31	5	65	25	18	27	179	63	103	1446		
	Limit	4834	852	31	5	65	25	18	27	179	63	103	1446	0	0
489	Actual	7357	804	17	2	264	60	97	329	315	43	78	1105		
	Limit	7357	804	17	2	264	60	97	329	315	43	78	1105	0	0
490	Actual	5450	447	48	4	173	18	25	79	172	31	86	976		
	Limit	5450	447	48	4	173	18	25	79	172	31	86	976	0	0
491	Actual	4720	901	22	4	64	46	64	55	294	99	96	1898		
	Limit	4720	901	22	4	64	46	64	55	294	99	96	1898	0	0
492	Actual	5737	838	57	8	140	37	59	27	104	65	162	664		
	Limit	5737	838	57	8	140	37	59	27	104	65	162	664	0	0
493	Actual	3756	852	117	27	80	45	33	29	106	83	94	476		
	Limit	3756	852	117	27	80	45	33	29	106	83	94	476	0	0
494	Actual	4996	667	64	9	54	20	26	41	203	27	96	1299		
	Limit	4996	667	64	9	54	20	26	41	203	27	96	1299	0	0

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495	Actual	12733	2941	105	24	109	82	28	48	563	189	106	1681		
	Limit	12733	2941	105	24	109	82	28	48	563	189	106	1681	0	0
496	Actual	4548	745	14	2	5	1	9	10	179	29	55	29		
	Limit	4548	745	14	2	5	1	9	10	179	29	55	29	0	0
497	Actual	3397	1469	5	2	77	75	22	22	110	62	68	493		
	Limit	3397	1469	5	2	77	75	22	22	110	62	68	493	0	0
498	Actual	5143	795	27	4	110	82	45	79	227	161	70	1702		
	Limit	5143	795	27	4	110	82	45	79	227	161	70	1702	0	0
499	Actual	3050	858	5	1	69	27	19	51	142	61	47	77		
	Limit	3050	858	5	1	69	27	19	51	142	61	47	77	0	0
500	Actual	4559	1188	54	14	43	50	71	74	166	121	118	1510		
	Limit	4559	1188	54	14	43	50	71	74	166	121	118	1510	0	0
501	Actual	2620	832	15	5	65	24	19	41	155	48	38	200		
	Limit	2620	832	15	5	65	24	19	41	155	48	38	200	0	0
502	Actual	5545	1829	14	5	91	112	17	55	241	142	87	2394		
	Limit	5545	1829	14	5	91	112	17	55	241	142	87	2394	0	0
503	Actual	6368	1156	41	7	353	151	98	260	372	158	178	1524		
	Limit	6368	1156	41	7	353	151	98	260	372	158	178	1524	0	0
504	Actual	3768	796	40	8	141	64	21	28	166	63	91	590		
	Limit	3768	796	40	8	141	64	21	28	166	63	91	590	0	0
505	Actual	6684	935	54	8	111	97	42	5	243	70	95	339		
	Limit	6684	935	54	8	111	97	42	5	243	70	95	339	0	0
506	Actual	2424	1133	16	8	121	94	18	29	106	85	30	200		
	Limit	2424	1133	16	8	121	94	18	29	106	85	30	200	0	0
507	Actual	4555	1077	17	4	80	119	10	30	304	117	138	160		
	Limit	4555	1077	17	4	80	119	10	30	304	117	138	160	0	0

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508	Actual	4490	1603	7	3	57	92	43	41	235	130	89	1062		
	Limit	4490	1603	7	3	57	92	43	41	235	130	89	1062	0	0
509	Actual	6931	1040	83	12	49	108	78	12	363	74	117	236		
	Limit	6931	1040	83	12	49	108	78	12	363	74	117	236	0	0
510	Actual	3051	836	3	1	43	18	20	53	123	38	44	95		
	Limit	3051	836	3	1	43	18	20	53	123	38	44	95	0	0
511	Actual	4049	1519	43	16	147	125	62	40	213	118	95	2230		
	Limit	4049	1519	43	16	147	125	62	40	213	118	95	2230	0	0
512	Actual	6350	878	26	4	79	64	54	9	289	68	47	901		
	Limit	6350	878	26	4	79	64	54	9	289	68	47	901	0	0
513	Actual	4822	266	55	3	93	22	64	42	201	34	97	650		
	Limit	4822	266	55	3	93	22	64	42	201	34	97	650	0	0
514	Actual	5957	1200	43	9	194	223	42	28	175	73	164	720		
	Limit	5957	1200	43	9	194	223	42	28	175	73	164	720	0	0
515	Actual	2805	690	28	7	79	35	16	30	150	28	51	172		
	Limit	2805	690	28	7	79	35	16	30	150	28	51	172	0	0
516	Actual	5615	1388	21	5	232	87	55	45	249	103	52	572		
	Limit	5615	1388	21	5	232	87	55	45	249	103	52	572	0	0
517	Actual	9620	1697	168	30	317	205	78	89	342	153	158	987		
	Limit	9620	1697	168	30	317	205	78	89	342	153	158	987	0	0
518	Actual	4338	769	18	3	83	25	46	48	171	64	69	1946		
	Limit	4338	769	18	3	83	25	46	48	171	64	69	1946	0	0
519	Actual	2592	755	16	5	46	56	7	6	88	47	95	35		
	Limit	2592	755	16	5	46	56	7	6	88	47	95	35	0	0
520	Actual	3775	731	43	8	91	55	27	18	150	30	105	438		
	Limit	3775	731	43	8	91	55	27	18	150	30	105	438	0	0

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521	Actual	12980	1195	84	8	70	64	20	151	569	108	163	1631		
	Limit	12980	1195	84	8	70	64	20	151	569	108	163	1631	0	0
522	Actual	4883	714	58	8	111	46	22	74	221	57	56	4185		
	Limit	4883	714	58	8	111	46	22	74	221	57	56	4185	0	0
523	Actual	6566	1399	146	31	53	32	16	50	234	101	80	5571		
	Limit	6566	1399	146	31	53	32	16	50	234	101	80	5571	0	0
524	Actual	3757	644	15	3	48	13	38	40	150	58	52	1216		
	Limit	3757	644	15	3	48	13	38	40	150	58	52	1216	0	0
525	Actual	5684	1323	0	0	62	28	20	45	233	127	77	3751		
	Limit	5684	1323	0	0	62	28	20	45	233	127	77	3751	0	0
526	Actual	10606	3091	47	14	122	149	69	117	494	248	377	765		
	Limit	10606	3091	47	14	122	149	69	117	494	248	377	765	0	0
527	Actual	8290	806	23	2	72	52	57	45	269	61	178	4603		
	Limit	8290	806	23	2	72	52	57	45	269	61	178	4603	0	0
528	Actual	6507	1127	49	8	103	21	44	56	312	94	83	2735		
	Limit	6507	1127	49	8	103	21	44	56	312	94	83	2735	0	0
529	Actual	8245	1449	38	7	39	30	27	97	233	92	82	2982		
	Limit	8245	1449	38	7	39	30	27	97	233	92	82	2982	0	0
530	Actual	7291	1504	106	22	129	55	86	27	106	100	175	941		
	Limit	7291	1504	106	22	129	55	86	27	106	100	175	941	0	0
531	Actual	3943	663	22	4	84	24	58	47	190	64	8	977		
	Limit	3943	663	22	4	84	24	58	47	190	64	8	977	0	0
532	Actual	3477	410	65	8	144	45	41	26	140	38	54	294		
	Limit	3477	410	65	8	144	45	41	26	140	38	54	294	0	0
533	Actual	3325	471	16	2	77	9	7	20	147	14	78	298		
	Limit	3325	471	16	2	77	9	7	20	147	14	78	298	0	0

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534	Actual	2890	846	0	0	96	56	9	15	127	53	35	177		
	Limit	2890	846	0	0	96	56	9	15	127	53	35	177	0	0
535	Actual	5618	917	24	4	128	64	15	3	273	21	91	3506		
	Limit	5618	917	24	4	128	64	15	3	273	21	91	3506	0	0
536	Actual	1619	985	0	0	90	89	31	18	64	86	41	81		
	Limit	1619	985	0	0	90	89	31	18	64	86	41	81	0	0
537	Actual	2982	2053	10	7	66	68	21	0	86	178	51	66		
	Limit	2982	2053	10	7	66	68	21	0	86	178	51	66	0	0
538	Actual	4565	1062	28	7	111	103	23	19	221	75	100	1007		
	Limit	4565	1062	28	7	111	103	23	19	221	75	100	1007	0	0
539	Actual	2405	694	0	0	142	27	30	116	144	67	35	68		
	Limit	2405	694	0	0	142	27	30	116	144	67	35	68	0	0
540	Actual	3255	1011	2	1	56	27	17	40	169	86	35	111		
	Limit	3255	1011	2	1	56	27	17	40	169	86	35	111	0	0
541	Actual	2336	433	0	0	79	19	23	0	72	31	0	1		
	Limit	2336	433	0	0	79	19	23	0	72	31	0	1	0	0
542	Actual	3596	1103	53	16	160	40	25	41	36	17	29	111		
	Limit	3596	1103	53	16	160	40	25	41	36	17	29	111	0	0
543	Actual	7191	1450	40	8	141	16	12	9	288	99	68	413		
	Limit	7191	1450	40	8	141	16	12	9	288	99	68	413	0	0
544	Actual	2178	518	14	3	65	75	55	15	69	39	39	76		
	Limit	2178	518	14	3	65	75	55	15	69	39	39	76	0	0
545	Actual	2194	715	8	3	31	25	34	64	108	66	60	286		
	Limit	2194	715	8	3	31	25	34	64	108	66	60	286	0	0
546	Actual	2743	236	38	3	85	19	37	45	102	14	9	162		
	Limit	2743	236	38	3	85	19	37	45	102	14	9	162	0	0

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547	Actual	3409	716	6	1	112	72	19	14	123	49	87	251		
	Limit	3409	716	6	1	112	72	19	14	123	49	87	251	0	0
548	Actual	2948	372	25	3	152	35	27	30	157	18	24	48		
	Limit	2948	372	25	3	152	35	27	30	157	18	24	48	0	0
549	Actual	4874	1416	0	0	109	129	131	29	223	112	106	194		
	Limit	4874	1416	0	0	109	129	131	29	223	112	106	194	0	0
550	Actual	4434	1009	0	0	89	279	93	41	183	58	14	165		
	Limit	4434	1009	0	0	89	279	93	41	183	58	14	165	0	0
551	Actual	4234	884	37	8	39	67	69	38	192	108	99	2121		
	Limit	4234	884	37	8	39	67	69	38	192	108	99	2121	0	0
552	Actual	11285	1165	9	1	132	102	22	47	341	93	59	2137		
	Limit	11285	1165	9	1	132	102	22	47	341	93	59	2137	0	0
553	Actual	12802	1541	108	13	266	78	84	152	563	104	238	1139		
	Limit	12802	1541	108	13	266	78	84	152	563	104	238	1139	0	0
554	Actual	4612	374	0	0	40	38	39	71	192	29	49	562		
	Limit	4612	374	0	0	40	38	39	71	192	29	49	562	0	0
555	Actual	3400	596	21	4	49	28	40	57	168	57	92	1740		
	Limit	3400	596	21	4	49	28	40	57	168	57	92	1740	0	0
556	Actual	3510	729	58	12	43	16	18	24	143	55	67	1009		
	Limit	3510	729	58	12	43	16	18	24	143	55	67	1009	0	0
557	Actual	6998	1521	5	1	123	39	32	79	11	107	85	27		
	Limit	6998	1521	5	1	123	39	32	79	11	107	85	27	0	0
558	Actual	4567	1195	34	9	28	96	52	71	124	57	76	667		
	Limit	4567	1195	34	9	28	96	52	71	124	57	76	667	0	0
559	Actual	6612	516	45	3	125	44	104	89	347	59	151	942		
	Limit	6612	516	45	3	125	44	104	89	347	59	151	942	0	0

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560	Actual	3818	1685	17	8	79	39	33	58	71	34	44	28		
	Limit	3818	1685	17	8	79	39	33	58	71	34	44	28	0	0
561	Actual	4238	863	18	4	119	30	25	60	103	48	78	146		
	Limit	4238	863	18	4	119	30	25	60	103	48	78	146	0	0
562	Actual	2683	987	18	7	41	50	64	39	104	82	77	2073		
	Limit	2683	987	18	7	41	50	64	39	104	82	77	2073	0	0
563	Actual	6035	4481	45	33	57	91	47	220	437	306	30	415		
	Limit	6035	4481	45	33	57	91	47	220	437	306	30	415	0	0
564	Actual	3962	1346	68	23	163	68	17	48	158	71	87	443		
	Limit	3962	1346	68	23	163	68	17	48	158	71	87	443	0	0
565	Actual	5120	4778	0	0	249	585	-110	55	263	442	8	187		
	Limit	5120	4778	0	0	249	585	296	55	263	442	8	187	0	0
566	Actual	3511	766	56	12	41	33	59	43	105	31	49	2166		
	Limit	3511	766	56	12	41	33	59	43	105	31	49	2166	0	0
567	Actual	2141	724	27	9	88	34	19	21	77	65	27	32		
	Limit	2141	724	27	9	88	34	19	21	77	65	27	32	0	0
568	Actual	7399	1647	66	15	247	75	56	122	336	100	117	1141		
	Limit	7399	1647	66	15	247	75	56	122	336	100	117	1141	0	0
569	Actual	2271	1293	20	11	130	240	94	147	126	109	140	1540		
	Limit	2271	1293	20	11	130	240	94	147	126	109	140	1540	0	0
570	Actual	2174	1300	8	5	172	168	80	72	84	161	135	768		
	Limit	2174	1300	8	5	172	168	80	72	84	161	135	768	0	0
571	Actual	3322	375	2	0	117	88	69	76	163	26	104	326		
	Limit	3322	375	2	0	117	88	69	76	163	26	104	326	0	0
572	Actual	2991	485	19	3	79	103	4	81	131	22	77	1640		
	Limit	2991	485	19	3	79	103	4	81	131	22	77	1640	0	0

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573	Actual	3582	1012	51	14	105	73	17	139	74	77	133	1795		
	Limit	3582	1012	51	14	105	73	17	139	74	77	133	1795	0	0
574	Actual	3593	1090	70	21	63	32	29	36	144	86	126	7951		
	Limit	3593	1090	70	21	63	32	29	36	144	86	126	7951	0	0
575	Actual	2130	237	12	1	114	37	9	95	101	15	93	456		
	Limit	2130	237	12	1	114	37	9	95	101	15	93	456	0	0
576	Actual	1984	435	10	2	67	73	14	84	106	58	80	587		
	Limit	1984	435	10	2	67	73	14	84	106	58	80	587	0	0
577	Actual	2637	1185	26	12	159	92	15	74	100	121	126	874		
	Limit	2637	1185	26	12	159	92	15	74	100	121	126	874	0	0
578	Actual	3286	774	41	10	188	69	27	68	137	48	105	1081		
	Limit	3286	774	41	10	188	69	27	68	137	48	105	1081	0	0
579	Actual	2221	598	26	7	135	46	24	110	65	21	112	751		
	Limit	2221	598	26	7	135	46	24	110	65	21	112	751	0	0
580	Actual	1937	853	0	0	65	131	34	25	56	33	68	21		
	Limit	1937	853	0	0	65	131	34	25	56	33	68	21	0	0
581	Actual	7136	4344	31	19	133	297	176	258	365	416	382	624		
	Limit	7136	4344	31	19	133	297	176	258	365	416	382	624	0	0
582	Actual	1983	336	0	0	45	12	77	33	37	8	35	0		
	Limit	1983	336	0	0	45	12	76	33	37	8	35	0	0	0
583	Actual	1421	292	21	4	15	12	8	31	38	11	0	0		
	Limit	1421	292	21	4	15	12	8	31	38	11	0	0	0	0
584	Actual	2795	449	5	1	61	8	12	40	71	14	38	0		
	Limit	2795	449	5	1	61	8	12	40	71	14	38	0	0	0
585	Actual	1595	622	9	4	65	24	28	41	51	52	38	0		
	Limit	1595	622	9	4	65	24	28	41	51	52	38	0	0	0

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586	Actual	2026	657	11	4	36	10	23	43	43	19	35	0		
	Limit	2026	657	11	4	36	10	23	43	43	19	35	0	0	0
587	Actual	2225	587	6	2	16	14	23	43	55	27	25	0		
	Limit	2225	587	6	2	16	14	23	43	55	27	25	0	0	0
588	Actual	2495	853	13	4	40	28	28	41	50	55	34	0		
	Limit	2495	853	13	4	40	28	28	41	50	55	34	0	0	0
589	Actual	1790	509	8	2	44	13	19	38	33	13	21	0		
	Limit	1790	509	8	2	44	13	19	38	33	13	21	0	0	0
590	Actual	2429	884	16	6	93	29	28	32	127	15	22	0		
	Limit	2429	884	16	6	93	29	28	32	127	15	22	0	0	0
591	Actual	995	2	2	0	51	0	6	4	47	0	12	0		
	Limit	995	2	2	0	51	0	6	4	47	0	12	0	0	0
592	Actual	818	447	14	8	64	25	8	50	29	30	12	0		
	Limit	818	447	14	8	64	25	8	50	29	30	12	0	0	0
593	Actual	1476	248	1	0	67	42	17	15	43	18	16	0		
	Limit	1476	248	1	0	67	42	17	15	43	18	16	0	0	0
594	Actual	2139	626	23	7	28	24	29	45	119	47	29	0		
	Limit	2139	626	23	7	28	24	29	45	119	47	29	0	0	0
595	Actual	2352	582	11	3	58	15	29	49	80	36	38	0		
	Limit	2352	582	11	3	58	15	29	49	80	36	38	0	0	0
596	Actual	1977	302	4	1	33	8	27	39	89	13	31	0		
	Limit	1977	302	4	1	33	8	27	39	89	13	31	0	0	0
597	Actual	1243	43	6	0	65	1	14	37	51	3	43	0		
	Limit	1243	43	6	0	65	1	14	37	51	3	43	0	0	0
598	Actual	1550	323	7	2	76	11	20	44	64	24	35	0		
	Limit	1550	323	7	2	76	11	20	44	64	24	35	0	0	0

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599	Actual	1735	411	5	1	33	12	14	39	71	23	28	0		
	Limit	1735	411	5	1	33	12	14	39	71	23	28	0	0	0
600	Actual	1574	511	6	2	47	11	16	41	92	19	24	0		
	Limit	1574	511	6	2	47	11	16	41	92	19	24	0	0	0
601	Actual	1622	376	4	1	59	10	21	34	94	28	20	0		
	Limit	1622	376	4	1	59	10	21	34	94	28	20	0	0	0
602	Actual	1785	635	0	0	15	2	15	46	96	10	17	0		
	Limit	1785	635	0	0	15	2	15	46	96	10	17	0	0	0
603	Actual	2269	284	11	1	58	18	43	62	99	16	13	0		
	Limit	2269	284	11	1	58	18	43	46	99	16	13	0	0	0
604	Actual	2021	338	14	2	45	33	12	114	101	31	27	0		
	Limit	2021	338	14	2	45	33	12	63	101	31	27	0	0	0
605	Actual	1533	165	14	1	41	27	48	31	57	10	56	0		
	Limit	1533	165	14	1	41	27	48	31	57	10	56	0	0	0
606	Actual	1873	695	17	6	62	24	7	20	75	55	15	0		
	Limit	1873	695	17	6	62	24	7	20	75	55	15	0	0	0
607	Actual	1523	488	3	1	42	11	19	41	57	8	32	0		
	Limit	1523	488	3	1	42	11	19	41	57	8	32	0	0	0
608	Actual	865	191	9	2	17	6	30	9	39	6	18	0		
	Limit	865	191	9	2	17	6	30	9	39	6	18	0	0	0
609	Actual	2277	257	29	3	53	11	18	46	95	8	24	0		
	Limit	2277	257	29	3	53	11	18	46	95	8	24	0	0	0
610	Actual	1107	95	14	1	141	8	32	42	31	5	29	0		
	Limit	1107	95	14	1	125	8	32	42	31	5	29	0	0	0
611	Actual	1623	230	9	1	24	33	37	49	19	14	44	0		
	Limit	1623	230	9	1	24	33	37	49	19	14	44	0	0	0

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612	Actual	1243	222	5	1	117	44	21	13	53	13	51	0		
	Limit	1243	222	5	1	117	44	21	13	53	13	51	0	0	0
613	Actual	1551	361	12	3	13	14	13	25	64	11	19	0		
	Limit	1551	361	12	3	13	14	13	25	64	11	19	0	0	0
614	Actual	1742	50	23	1	24	2	15	19	34	2	23	0		
	Limit	1742	50	23	1	24	2	15	19	34	2	23	0	0	0
615	Actual	1668	324	10	2	36	22	15	17	77	26	32	0		
	Limit	1668	324	10	2	36	22	15	17	77	26	32	0	0	0
616	Actual	1927	404	29	6	17	22	22	32	97	16	15	0		
	Limit	1927	404	29	6	17	22	22	32	97	16	15	0	0	0
617	Actual	2129	443	3	1	46	8	24	49	87	17	46	0		
	Limit	2129	443	3	1	46	8	24	49	87	17	46	0	0	0
618	Actual	1635	428	20	5	92	46	27	23	87	20	56	0		
	Limit	1635	428	20	5	92	46	27	23	87	20	56	0	0	0
619	Actual	2278	704	3	1	55	19	34	49	77	36	41	0		
	Limit	2278	704	3	1	55	19	34	49	77	36	41	0	0	0
620	Actual	2017	275	4	1	50	7	18	32	83	12	25	0		
	Limit	2017	275	4	1	50	7	18	32	83	12	25	0	0	0
621	Actual	1857	222	17	2	11	12	13	24	87	19	28	0		
	Limit	1857	222	17	2	11	12	13	24	87	19	28	0	0	0
622	Actual	1561	243	15	2	9	13	12	21	69	15	24	0		
	Limit	1561	243	15	2	9	13	12	21	69	15	24	0	0	0
623	Actual	1458	224	9	1	26	25	12	24	20	7	20	0		
	Limit	1458	224	9	1	26	25	12	24	20	7	20	0	0	0
624	Actual	2176	407	5	1	31	15	21	42	121	25	28	0		
	Limit	2176	407	5	1	31	15	21	42	121	25	28	0	0	0

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625	Actual	2200	857	8	3	79	40	19	38	124	29	31	0		
	Limit	2200	857	8	3	79	40	19	38	124	29	31	0	0	0
626	Actual	1766	328	5	1	105	16	20	39	95	16	37	0		
	Limit	1766	328	5	1	105	16	20	39	95	16	37	0	0	0
627	Actual	2425	531	1	0	33	13	22	42	130	39	29	0		
	Limit	2425	531	1	0	33	13	22	42	130	39	29	0	0	0
628	Actual	1485	825	17	9	65	21	3	21	75	99	35	0		
	Limit	1485	825	17	9	65	21	3	21	75	98	35	0	0	0
629	Actual	2305	465	5	1	37	15	21	43	117	33	36	0		
	Limit	2305	465	5	1	37	15	21	43	117	33	36	0	0	0
630	Actual	2481	458	3	0	42	14	29	49	111	30	29	0		
	Limit	2481	458	3	0	42	14	29	49	111	30	29	0	0	0
631	Actual	2258	204	13	1	53	6	28	26	49	15	35	0		
	Limit	2258	204	13	1	53	6	28	26	49	15	35	0	0	0
632	Actual	2532	660	6	2	41	10	19	38	120	27	27	0		
	Limit	2532	660	6	2	41	10	19	38	120	27	27	0	0	0
633	Actual	818	307	5	2	28	14	34	22	19	9	8	0		
	Limit	818	307	5	2	28	14	34	22	19	9	8	0	0	0
634	Actual	2478	569	4	1	47	8	16	41	112	34	25	0		
	Limit	2478	569	4	1	47	8	16	41	112	34	25	0	0	0
635	Actual	3451	179	50	3	61	9	15	40	81	10	24	0		
	Limit	3451	179	50	3	61	9	15	40	81	10	24	0	0	0
636	Actual	2156	127	42	2	51	5	25	10	62	7	50	0		
	Limit	2156	127	42	2	51	5	25	10	62	7	50	0	0	0
637	Actual	2536	518	8	2	32	24	62	109	64	24	24	0		
	Limit	2536	518	8	2	32	24	62	109	64	24	24	0	0	0

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638	Actual	2174	569	18	5	49	24	66	43	132	31	48	0		
	Limit	2174	569	18	5	49	24	60	43	132	31	48	0	0	0
639	Actual	2672	376	50	7	14	17	15	27	158	33	59	0		
	Limit	2672	376	50	7	14	17	15	27	158	33	59	0	0	0
640	Actual	1958	660	0	0	43	48	23	83	29	22	44	0		
	Limit	1958	660	0	0	43	38	23	66	29	22	44	0	0	0
641	Actual	1706	555	18	6	25	12	22	11	42	16	41	0		
	Limit	1706	555	18	6	25	12	22	11	42	16	41	0	0	0
642	Actual	2740	578	3	1	45	10	23	38	156	18	32	0		
	Limit	2740	578	3	1	45	10	23	38	156	18	32	0	0	0
643	Actual	2000	524	8	2	133	18	19	45	121	27	35	0		
	Limit	2000	524	8	2	115	18	19	45	121	27	35	0	0	0
644	Actual	2435	229	7	1	71	8	30	19	138	22	56	0		
	Limit	2435	229	7	1	71	8	30	19	138	22	56	0	0	0
645	Actual	2808	461	11	2	61	17	39	14	27	4	20	0		
	Limit	2808	461	11	2	61	17	39	14	27	4	20	0	0	0
646	Actual	2168	233	14	2	92	19	19	29	112	4	53	0		
	Limit	2168	233	14	2	92	19	19	29	112	4	53	0	0	0
647	Actual	2664	448	4	1	54	11	20	46	51	15	29	0		
	Limit	2664	448	4	1	54	11	20	46	51	15	29	0	0	0
648	Actual	2783	520	17	3	68	13	13	25	124	30	39	0		
	Limit	2783	520	17	3	68	13	13	25	124	30	39	0	0	0
649	Actual	2752	390	5	1	100	22	21	44	111	34	19	0		
	Limit	2752	390	5	1	100	22	21	44	111	34	19	0	0	0
650	Actual	2591	569	20	4	38	24	26	25	84	23	66	0		
	Limit	2591	569	20	4	38	24	26	25	84	23	66	0	0	0

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Seq	Source	CWF	COE	M&S CWF	M&S COE	CWF Maint	COE Maint	NetSup + GSE	Net Ops	Depr CWF	Depr COE	Bene Fits	Pmt (000s)	Pmt Chg (000s)	Chg per Loop / 12
651	Actual	1770	284	3	1	50	14	18	42	105	17	29	0		
	Limit	1770	284	3	1	50	14	18	42	105	17	29	0	0	0
652	Actual	1357	533	19	7	65	20	28	39	65	21	64	0		
	Limit	1357	533	19	7	65	20	28	39	65	21	64	0	0	0
653	Actual	2315	554	13	3	45	9	19	44	132	39	32	0		
	Limit	2315	554	13	3	45	9	19	44	132	39	32	0	0	0
654	Actual	2011	526	4	1	49	13	17	42	115	31	30	0		
	Limit	2011	526	4	1	49	13	17	42	115	31	30	0	0	0
655	Actual	3161	353	39	4	57	18	16	11	158	28	33	0		
	Limit	3056	353	39	4	57	18	16	11	144	28	33	0	0	0
656	Actual	2331	533	6	1	62	30	18	47	131	34	23	0		
	Limit	2331	533	6	1	62	30	18	47	131	34	23	0	0	0
657	Actual	2010	462	5	1	44	16	19	39	76	18	31	0		
	Limit	2010	462	5	1	44	16	19	39	76	18	31	0	0	0
658	Actual	1316	288	10	2	54	29	12	31	15	24	35	0		
	Limit	1316	288	10	2	54	29	12	31	15	24	35	0	0	0
659	Actual	1540	3	3	0	26	0	18	32	71	0	29	0		
	Limit	1540	3	3	0	26	0	18	32	71	0	29	0	0	0
660	Actual	2376	886	40	15	54	14	37	22	119	68	35	0		
	Limit	2376	886	40	12	54	14	37	22	119	68	35	0	0	0
661	Actual	2331	554	5	1	48	14	25	49	109	15	33	0		
	Limit	2331	554	5	1	48	14	25	49	109	15	33	0	0	0
662	Actual	2244	465	10	2	71	28	21	45	113	24	31	0		
	Limit	2244	465	10	2	71	28	21	45	113	24	31	0	0	0
663	Actual	2061	656	4	1	23	26	39	34	59	33	63	0		
	Limit	2061	656	4	1	23	26	39	34	59	33	63	0	0	0

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Seq	Source	CWF	COE	M&S CWF	M&S COE	CWF Maint	COE Maint	NetSup + GSE	Net Ops	Depr CWF	Depr COE	Bene Fits	Pmt (000s)	Pmt Chg (000s)	Chg per Loop / 12
664	Actual	1987	1097	6	3	25	33	25	24	48	0	16	0		
	Limit	1987	906	6	3	25	33	25	24	48	0	16	0	0	0
665	Actual	2386	689	5	1	54	13	22	45	111	24	36	0		
	Limit	2386	689	5	1	54	13	22	45	111	24	36	0	0	0
666	Actual	1585	471	3	1	33	10	16	39	71	15	24	0		
	Limit	1585	471	3	1	33	10	16	39	71	15	24	0	0	0
667	Actual	2322	725	6	2	46	16	14	41	128	52	32	0		
	Limit	2322	725	6	2	46	16	14	41	128	52	32	0	0	0
668	Actual	1602	334	20	4	47	13	41	15	56	25	26	0		
	Limit	1602	334	20	4	47	13	41	15	56	25	26	0	0	0
669	Actual	2716	925	11	4	25	-63	12	26	66	84	54	0		
	Limit	2716	925	11	4	25	106	12	26	66	84	54	0	0	0
670	Actual	1705	416	3	1	43	8	23	38	80	22	26	0		
	Limit	1705	416	3	1	43	8	23	38	80	22	26	0	0	0
671	Actual	3246	1211	16	6	45	21	22	26	160	18	29	0		
	Limit	3246	1211	16	6	45	21	22	26	160	18	29	0	0	0
672	Actual	2901	393	6	1	15	9	5	13	159	35	18	0		
	Limit	2901	393	6	1	15	9	5	13	159	35	18	0	0	0
673	Actual	2481	497	6	1	60	6	24	53	115	25	38	0		
	Limit	2481	497	6	1	60	6	24	53	115	25	38	0	0	0
674	Actual	2173	482	7	1	72	19	18	45	108	24	46	0		
	Limit	2173	482	7	1	72	19	18	45	108	24	46	0	0	0
675	Actual	1868	451	4	1	37	6	19	36	86	26	26	0		
	Limit	1868	451	4	1	37	6	19	36	86	26	26	0	0	0
676	Actual	1897	740	52	20	47	35	20	11	42	23	40	0		
	Limit	1897	740	52	11	47	35	20	11	42	23	40	0	0	0

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677	Actual	2428	0	11	0	137	0	6	3	87	0	46	0		
	Limit	2428	0	11	0	137	0	6	3	87	0	46	0	0	0
678	Actual	1611	137	11	1	108	18	10	31	92	5	42	0		
	Limit	1611	137	11	1	108	18	10	31	92	5	42	0	0	0
679	Actual	1484	210	71	10	122	21	8	21	73	8	14	0		
	Limit	1484	210	68	10	122	21	8	21	73	8	14	0	0	0
680	Actual	1628	208	8	1	56	24	8	10	89	14	106	0		
	Limit	1628	208	8	1	56	24	8	10	89	14	106	0	0	0
681	Actual	1900	58	8	0	39	3	13	49	32	2	7	0		
	Limit	1900	58	8	0	39	3	13	49	32	2	7	0	0	0
682	Actual	2701	220	36	3	64	5	18	9	108	3	17	0		
	Limit	2701	220	36	3	64	5	18	9	108	3	17	0	0	0
683	Actual	2326	834	26	9	46	24	17	52	122	53	39	0		
	Limit	2326	834	26	9	46	24	17	52	122	53	39	0	0	0
684	Actual	2508	189	3	0	76	5	14	16	107	12	42	0		
	Limit	2508	189	3	0	76	5	14	16	107	12	42	0	0	0
685	Actual	1852	512	2	1	87	11	29	42	92	28	32	0		
	Limit	1852	512	2	1	87	11	29	42	92	28	32	0	0	0
686	Actual	2476	315	7	1	69	5	18	9	23	11	12	0		
	Limit	2476	315	7	1	69	5	18	9	23	11	12	0	0	0
687	Actual	2790	50	4	0	28	0	13	27	132	0	3	0		
	Limit	2790	50	4	0	28	0	13	27	132	0	3	0	0	0
688	Actual	1351	185	8	1	53	11	27	25	59	16	16	0		
	Limit	1351	185	8	1	53	11	27	25	59	16	16	0	0	0
689	Actual	2316	438	3	1	40	10	18	46	115	32	36	0		
	Limit	2316	438	3	1	40	10	18	46	115	32	36	0	0	0

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690	Actual	1248	1280	22	23	36	19	42	22	53	58	26	0		
	Limit	1248	1280	22	18	36	19	42	22	53	58	26	0	0	0
691	Actual	2364	798	6	2	30	11	15	21	115	33	21	0		
	Limit	2364	798	6	2	30	11	15	21	115	33	21	0	0	0
692	Actual	2162	46	13	0	99	2	0	40	113	4	34	0		
	Limit	2162	46	13	0	99	2	0	40	113	4	34	0	0	0
693	Actual	1967	42	5	0	58	3	0	27	94	1	18	0		
	Limit	1967	42	5	0	58	3	0	27	94	1	18	0	0	0
694	Actual	1659	380	4	1	67	35	0	39	10	8	24	0		
	Limit	1659	380	4	1	67	35	0	39	10	8	24	0	0	0
695	Actual	3074	294	19	2	55	9	26	32	133	19	61	0		
	Limit	3074	294	19	2	55	9	26	32	133	19	61	0	0	0
696	Actual	1618	472	0	0	154	21	18	14	91	12	79	0		
	Limit	1618	472	0	0	154	21	18	14	91	12	79	0	0	0
697	Actual	2459	359	3	0	27	9	11	21	92	11	23	0		
	Limit	2459	359	3	0	27	9	11	21	92	11	23	0	0	0
698	Actual	2610	244	6	1	85	10	17	43	137	22	32	0		
	Limit	2610	244	6	1	85	10	17	43	137	22	32	0	0	0
699	Actual	1689	347	31	6	55	16	30	43	78	30	40	0		
	Limit	1689	347	31	6	55	16	30	43	78	30	40	0	0	0
700	Actual	2722	425	11	2	118	24	19	46	116	8	54	0		
	Limit	2722	425	11	2	118	24	19	46	116	8	54	0	0	0
701	Actual	2851	255	20	2	132	28	50	18	113	19	42	0		
	Limit	2851	255	20	2	132	28	50	18	113	19	42	0	0	0
702	Actual	2411	415	8	1	69	21	6	38	104	30	36	0		
	Limit	2411	415	8	1	69	21	6	38	104	30	36	0	0	0

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703	Actual	2281	447	51	10	68	12	32	42	99	31	87	0		
	Limit	2281	447	51	10	68	12	32	42	99	31	87	0	0	0
704	Actual	2582	532	4	1	32	11	21	51	105	31	27	0		
	Limit	2582	532	4	1	32	11	21	51	105	31	27	0	0	0
705	Actual	2798	69	0	0	71	4	4	2	116	4	0	0		
	Limit	2798	69	0	0	71	4	4	2	116	4	0	0	0	0
706	Actual	2057	397	17	3	67	37	21	4	66	41	26	0		
	Limit	2057	397	17	3	67	37	21	4	66	41	26	0	0	0
707	Actual	2296	587	3	1	36	12	17	38	122	40	33	0		
	Limit	2296	587	3	1	36	12	17	38	122	40	33	0	0	0
708	Actual	1581	440	7	2	91	37	14	21	67	42	43	0		
	Limit	1581	440	7	2	91	37	14	21	67	42	43	0	0	0
709	Actual	2997	226	29	2	38	8	29	10	116	16	24	0		
	Limit	2997	226	29	2	38	8	29	10	116	16	24	0	0	0
710	Actual	1964	499	10	3	30	15	15	49	67	46	31	0		
	Limit	1964	499	10	3	30	15	15	49	67	46	31	0	0	0
711	Actual	3164	245	27	2	67	10	45	23	154	16	29	0		
	Limit	2419	245	27	2	67	10	40	23	131	16	29	0	0	0
712	Actual	1957	369	18	3	59	29	13	20	88	22	59	0		
	Limit	1957	369	18	3	59	29	13	20	88	22	59	0	0	0
713	Actual	2286	405	6	1	93	20	18	36	73	27	43	0		
	Limit	2286	405	6	1	93	20	18	36	73	27	43	0	0	0
714	Actual	1535	429	33	9	45	41	34	20	57	19	39	0		
	Limit	1535	429	33	9	45	41	34	20	57	19	39	0	0	0
715	Actual	3270	886	4	1	69	28	33	47	19	31	34	0		
	Limit	3270	886	4	1	69	28	33	47	19	31	34	0	0	0

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716	Actual	2914	834	17	5	25	4	35	32	116	54	40	0		
	Limit	2914	834	17	5	25	4	35	32	116	54	40	0	0	0
717	Actual	1423	40	19	1	7	2	16	16	58	5	32	0		
	Limit	1423	40	19	1	7	2	16	16	58	5	32	0	0	0
718	Actual	1320	349	12	3	65	16	7	5	55	22	42	0		
	Limit	1320	349	12	3	65	16	7	5	55	22	42	0	0	0
719	Actual	1989	323	17	3	44	9	16	12	64	21	17	0		
	Limit	1989	323	17	3	44	9	16	12	64	21	17	0	0	0
720	Actual	1324	642	0	0	29	24	47	83	56	65	26	0		
	Limit	1324	642	0	0	29	24	47	83	56	65	26	0	0	0

Appendix E

Professor Roger Koenker, Paper: Assessment of FCC Quantile Regression Methods for Estimation of Reimbursable Cost Limits

ASSESSMENT OF FCC QUANTILE REGRESSION METHODS FOR ESTIMATION OF REIMBURSABLE COST LIMITS

ROGER KOENKER

EXECUTIVE SUMMARY. The FCC "Order and Further Notice of Proposed Ratemaking" of November 18, 2011 proposes quantile regression methods to estimate 90th percentiles of carrier costs conditional on loops served and a variety of other characteristics of study areas. I have been able to replicate the point estimates in Appendix H of the FCC Order for each of the separate cost components, and have also illustrated the cost adjustments entailed by these estimates for each of the cost categories.

My primary criticism of the proposed FCC methodology lies in the way that cost estimates for individual cost components are aggregated. As I show in Section 3, the proposed aggregation yields cost limits that may be unduly stringent in some cases, and unduly lenient in others. A preferable, and simpler, approach would be to develop one conditional quantile model for aggregate costs.

Selection of conditioning covariates is an crucial aspect of any modeling exercise of the type proposed by the FCC. I have argued in Section 4 that inclusion of seemingly irrelevant covariates can be damaging to the validity of the model predictions because their inclusion tends to inflate the variability of those predictions. Based on some limited empirical investigation, I found no obvious need to incorporate more elaborate nonlinear effects beyond the current log-linear specification proposed, however this possibility may deserve some further attention. Measurement error in the included covariates is another source of potential bias in the proposed cost estimates, but I am reluctant to try to evaluate this source of bias.

Finally, I have expressed some concern about the rather cavalier treatment of the log transformation as applied to some of the model covariates. In several cases more than half of the sample observations were assigned quite arbitrary values of zero, and this procedure may create another source of instability in the model estimates.

1. INTRODUCTION

Having reviewed Appendix H and related materials of the FCC's "Order and Further Notice of Proposed Ratemaking" released on November 18, 2011, I would like to offer the following comments and suggestions. I will confine my comments to issues related to the use of quantile regression modeling proposed by the Commission for determining carrier specific limits on allowed costs.

2. A PRECIS OF THE PROPOSED METHODOLOGY

I will begin with a brief summary of the proposed methodology as laid out in Appendix H. Costs are divided into two broad categories: capital expenditures (capex)

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TABLE 1. Replication of Table 1 of Appendix H of FCC 11-161

Covariates	AS1	AS2	AS7	AS8	AS13	AS14	AS15	AS16	AS17	AS18	AS21	AS22
Intercept	10.378	8.933	4.261	2.419	7.263	7.263	6.055	6.929	7.269	6.547	5.822	7.220
	(35.211)	(43.907)	(7.544)	(3.687)	(22.140)	(25.597)	(11.064)	(16.675)	(24.580)	(28.016)	(20.485)	(10.177)
landarea-ua	−0.101	0.137	0.596	0.265	−0.004	−0.289	0.098	0.219	0.169	0.482	−0.384	−0.467
	(−0.180)	(0.372)	(0.876)	(0.788)	(−0.032)	(−0.941)	(0.171)	(0.699)	(0.322)	(0.885)	(−7.170)	(−1.865)
landarea-uc	0.006	0.022	−0.005	−0.061	−0.216	−0.018	0.029	0.145	−0.015	−0.109	−0.104	−0.297
	(0.086)	(0.197)	(−0.030)	(−0.193)	(−1.606)	(−0.141)	(0.140)	(0.778)	(−0.145)	(−0.774)	(−0.863)	(−0.867)
landarea-nu	0.163	0.138	0.218	0.215	0.083	0.143	0.220	0.054	0.117	0.171	0.186	0.222
	(3.688)	(2.597)	(2.605)	(2.670)	(2.576)	(2.161)	(2.910)	(0.750)	(2.623)	(2.771)	(3.539)	(1.350)
hu-ua	−0.036	0.090	0.143	−0.006	0.103	−0.052	−0.008	−0.189	−0.052	0.191	−0.230	−0.454
	(−0.199)	(0.732)	(0.480)	(−0.040)	(1.347)	(−0.492)	(−0.026)	(−2.129)	(−0.194)	(0.849)	(−5.928)	(−4.937)
hu-uc	0.166	0.194	0.222	0.250	0.035	0.026	0.048	0.223	0.161	0.174	0.241	0.151
	(3.619)	(2.876)	(1.839)	(1.205)	(0.488)	(0.249)	(0.338)	(1.808)	(3.425)	(1.376)	(3.092)	(0.453)
hu-nu	−0.324	−0.432	−0.519	−0.655	0.059	−0.272	−0.185	−0.337	−0.319	−0.216	−0.125	−0.149
	(−6.981)	(−7.490)	(−2.323)	(−3.044)	(1.044)	(−4.086)	(−1.053)	(−2.514)	(−2.517)	(−2.477)	(−1.558)	(−0.734)
blocks-ua	0.160	−0.123	−0.492	−0.019	−0.071	0.303	0.001	0.228	0.038	−0.454	0.563	1.037
	(0.309)	(−0.398)	(−0.750)	(−0.077)	(−0.453)	(1.001)	(0.001)	(0.964)	(0.119)	(−0.729)	(10.953)	(5.171)
blocks-nu	0.134	0.200	0.228	0.297	0.056	0.113	−0.129	0.135	0.176	0.063	0.084	−0.259
	(2.030)	(2.323)	(1.367)	(1.740)	(0.811)	(1.007)	(−0.899)	(1.017)	(2.107)	(0.637)	(0.855)	(−0.934)
blocks-uc	−0.252	−0.318	−0.341	−0.388	0.039	−0.034	−0.073	−0.325	−0.251	−0.246	−0.297	−0.089
	(−3.568)	(−3.703)	(−1.778)	(−1.245)	(0.325)	(−0.185)	(−0.314)	(−1.693)	(−3.049)	(−1.315)	(−2.301)	(−0.177)
loops	0.885	0.964	1.167	1.291	0.542	0.725	0.919	0.876	0.892	0.834	0.785	0.769
	(13.113)	(21.734)	(5.352)	(6.627)	(6.855)	(21.742)	(4.864)	(8.200)	(6.746)	(10.756)	(17.152)	(4.561)
PWater	0.866	−0.071	−0.434	−1.103	0.299	−0.244	0.808	1.731	0.577	−0.821	−0.246	−0.084
	(5.476)	(−0.164)	(−0.275)	(−1.277)	(0.255)	(−0.408)	(0.641)	(1.632)	(1.224)	(−3.118)	(−0.139)	(−0.063)

and operating costs (opex). Within these categories there are various subcategories, I will refer to these categories by the same abbreviations, AS1, AS2, ... used in Appendix H. For each of these 12 subcategories the FCC proposes to estimate a quantile regression model of the form

$$Q_{C_{ij}}(\tau|x_j) = x_j^\top \beta_i(\tau)$$

where C_{ij} denotes the (natural) logarithm of cost in category i for carrier j, τ denotes the quantile of interest taken to be 0.90 throughout, and x_j denotes a vector of characteristics of the jth carrier, notably the number of loops served and various other features of the service areas, such as population density, land area, etc. My attempt to replicate the results of Table 1 of Appendix H appears above as Table 1, and is based on data provided by NECA on 720 study areas. Comparison of the two tables reveals that the estimated coefficients agree to the four significant figures reported in the original table. However, reported t-statistics differ, sometimes considerably, between the two tables. This may be attributed to differences in the methods used to estimate standard errors: the bootstrap method used for Appendix H has an inherently stochastic component, whereas the standard errors employed in my Table 1 are based on the "nid" local density estimation method described in Koenker(2005, §3.4.2). The p-values obtained by the two approaches are quite similar, indicating that loops are a highly significant determinant for all cost categories, while the other covariates, with a few exceptions, are less so. I will return to the role of choosing these covariates in Section 4.

Figures 1 and 2 illustrate the fundamental relationship underlying the regression results reported in Table 1. For each of the first two cost categories, actual (reported) costs are plotted against loops on a (natural) log-log scale. Similar plots for the

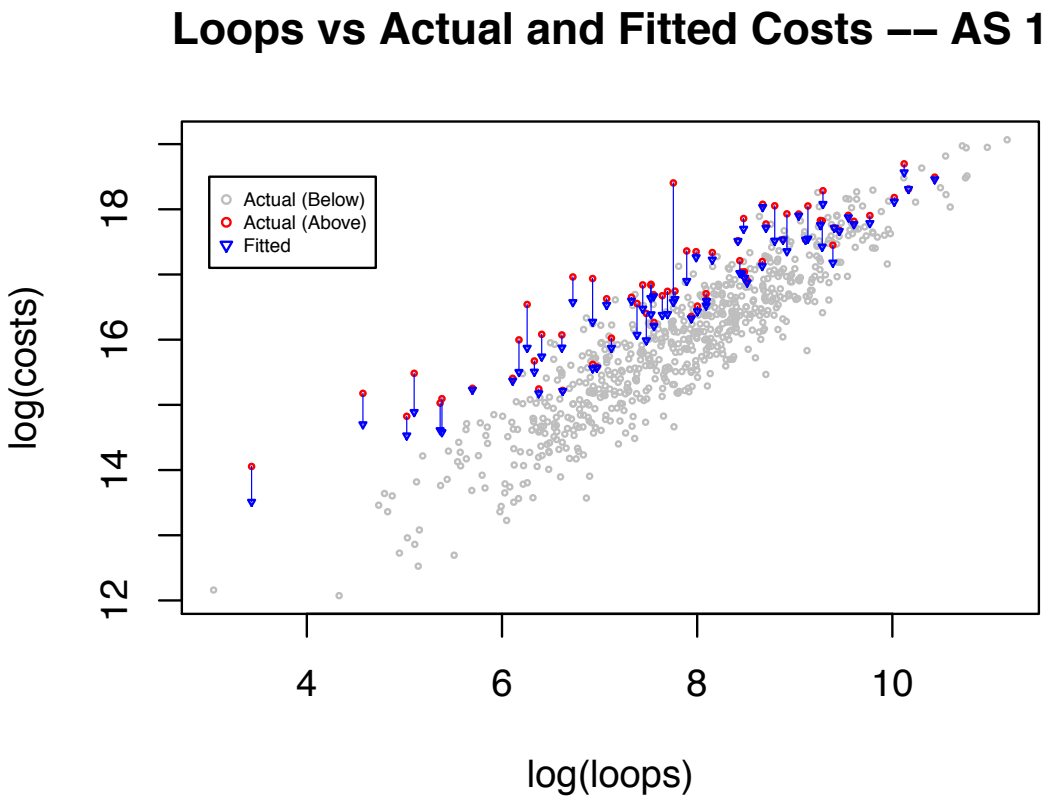

FIGURE 1. Scatter Plot of Cost Component AS 1: Grey points in the figure indicate study areas *below* the estimated 90th percentile fit, red points indicate points *above* this fit and are connected to their associated blue fitted points with a vertical line.

remaining cost categories appear in Appendix A. Points lying *below* the fitted 90th percentile surface appear as grey points in these figures. Observations *above* the 90th percentile surface appear in red connected to their respective blue, triangular, fitted values by a vertical line. As expected, roughly 10 percent of the points fall above the fitted surface for each cost category. Had the cost model only contained the logarithm of loops as a conditioning variable the fitted (blue) triangles would lie exactly on a straight line in these plots, however the presence of the other conditioning variables perturbs them somewhat from such a strict linear relationship.

Given models for the 90th percentile for each of the cost categories, the proposed method aggregates the limits on the individual categories to produce an "adjusted cost per loop" for each carrier. Thus, if carrier i has fitted cost limit $\bar{c}_{ij}$ for cost

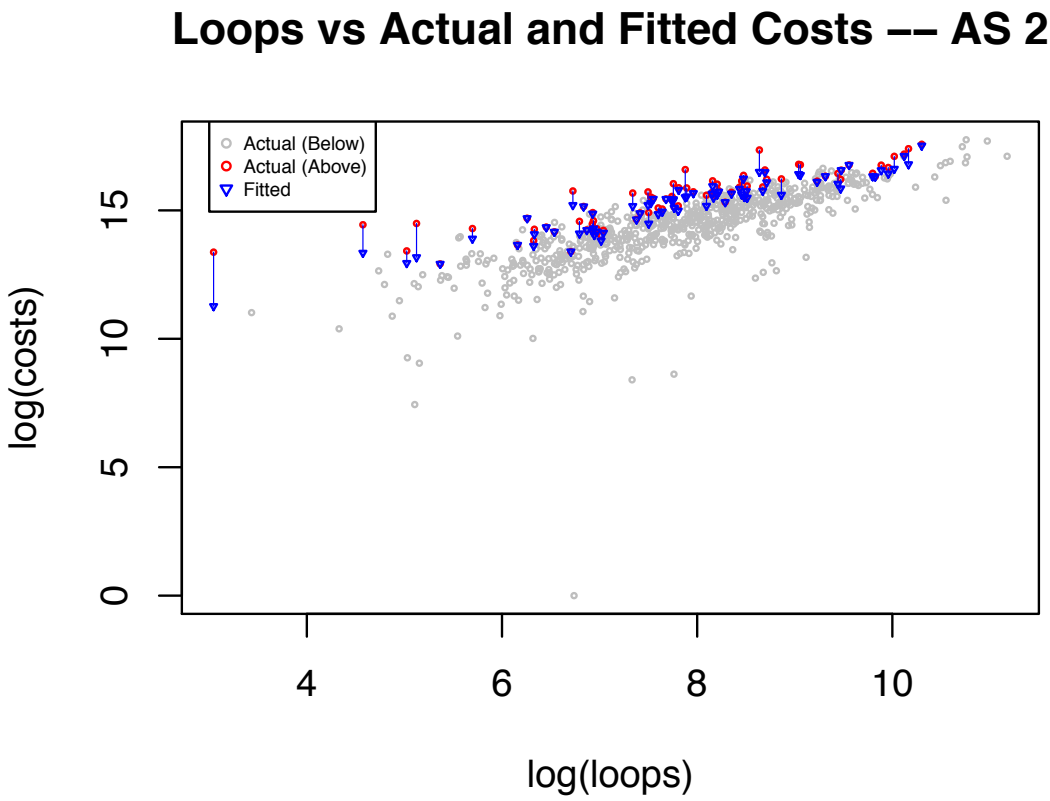

FIGURE 2. Scatter Plot of Cost Component AS 2: Grey points in the figure indicate study areas *below* the estimated 90th percentile fit, red points indicate points *above* this fit and are connected to their associated blue fitted points with a vertical line.

category j and actual costs, y_{ij} the allowed upper bound would be,

$$B_i = \sum_{j=1}^{m} \min\{y_{ij}, \bar{c}_{ij}\},$$

that is, the bounds are applied to each cost category and then summed. Some consequences of this procedure are explored in the next section.

3. On Aggregation of Quantiles

How should we interpret the bounds, B_i described above? I will argue that any interpretation would need to rely heavily on (heretofore unstated) assumptions about the interdependence among the cost elements, $(y_{i1}, \cdots, y_{im})$. Such dependence would

usually be interpreted within the context of the classical economic theory of production. In this paradigm factors of production would typically be considered to be "substitutes" indicating that they exhibit negative dependence – more of one factor would compensate for less of another. Of course, the theory also allows for factor complementarity that implies that the use of more of one factor may require more of another as well. Such theory is usually developed in a non-stochastic setting, however, for present purposes it is perhaps more convenient to adopt a purely probabilistic view. Conditional on covariates, x, we have a joint distribution $F(y|x)$ for a vector of cost components, $y = (y_1, \cdots, y_m)$. Each component has an associated marginal distribution, $F_j(y_j|x)$, and quantile function, $Q_j(\tau|x) = F_j^{-1}(y|x)$. It is these marginal quantile functions that have been estimated and are reported in Table 1. And, of course, the cost limits, $\bar{c}_{ij}$ referred to above are nothing but the $Q_j(\tau|x_i)$ evaluated at $\tau = 0.9$. It is clear that for each cost component separately the capped random variables, $\bar{y}_{ij} = \min\{y_{ij}, \bar{c}_{ij}\}$ have $\tau = 0.9$ quantile, $\bar{c}_{ij}$, but what about their sum?

Unlike means, for which the mean of the sum of random variables is simply the sum of the means of the variables, $\mathbb{E}\sum Y_i = \sum \mathbb{E}Y_i$, it is *not* the case that sums of marginal quantiles equal the quantiles of the sum of those random variables. It is perhaps easiest to grasp the main idea geometrically as illustrated in Figure 3.

Suppose we have only two cost categories exhibiting the typical substitutability pattern illustrated by the elliptical density contours of the Figure. For purposes of illustration I adopt the very simple assumption that the two factors are distributed as bivariate normal with negative correlation; this assumption facilitates explicit computations, but is not at all essential to the argument. The two concentric density contours are constructed to contain 0.50 and 0.90 of the probability mass respectively. The marginal 90th percentile limits are depicted by the red vertical and horizontal lines. In such circumstances a carrier that exceeds the y_2 limit, like the point labeled A in the figure, is likely to lie far below the limit for y_1, and vice versa. Thus, if we are really interested in evaluating quantiles for the sum of the two cost components, it is not the cases that have extreme values of one of the two components that we should most worry about, it is those cases that are *near the limits in both cost components.* The blue density lying along the 45 degree line represents the density of the sum of the two components y_1 and y_2. The perpendicular blue line indicates the position of the 90th percentile of the sum of the two components. When we compute where the points, A, B, and C fall on this axis we find that they correspond to the points a, b, and c, respectively. Thus, the point B, which is extreme, i.e. exceeding the 0.90 limit on the y_1 axis, appears almost at the center of the distribution of total costs. Even the point A is well within the 0.90 cutoff for the total cost, while point C, which is extreme for neither of the individual coordinates, is extreme from the perspective of aggregate cost.

Extravagant expenditure on one cost category, as we have seen, is not necessarily a sign of poor overall management, or general carrier inefficiency. As in our simple example, there are many examples in the NECA data of carriers that exceed

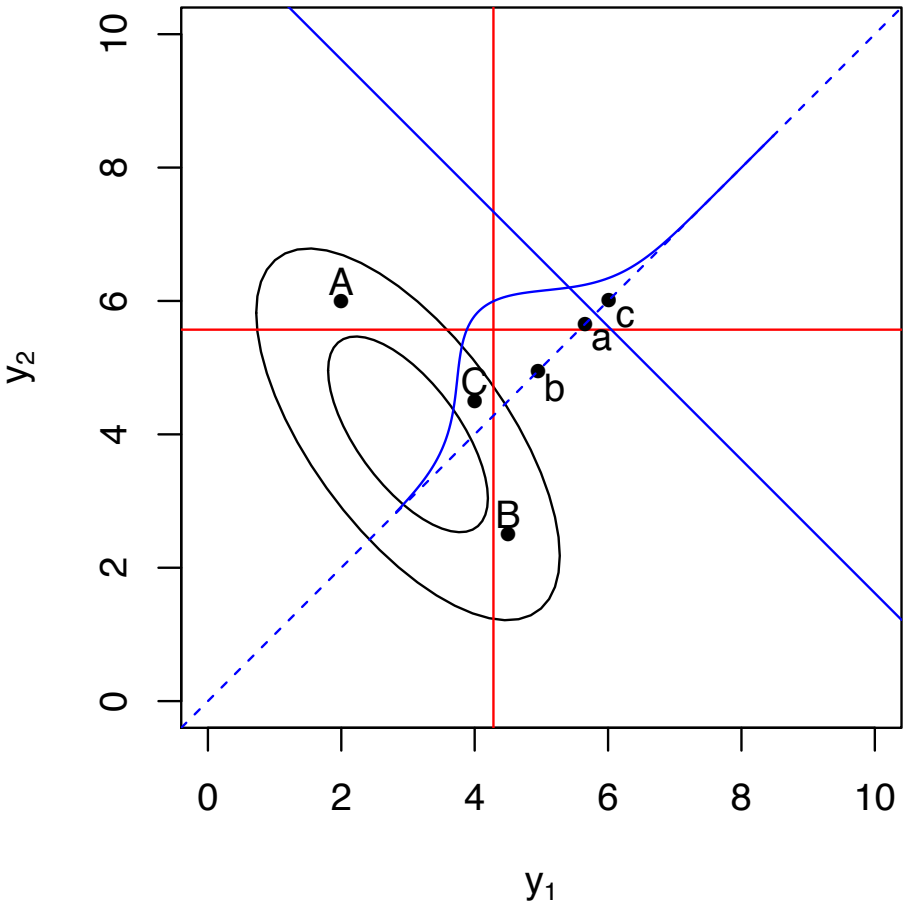

FIGURE 3. Aggregation of Quantiles – An Example: The red vertical lines indicate the 90th percentiles of the y_1 and y_2 coordinates. The concentric ellipses represent the 50th and 90th percentile density contours of the joint distribution of (y_1, y_2). The dashed blue 45 degree line indicates the aggregate $y_1 + y_2$ axis, the blue bell-shaped curve represents the density of this aggregate, and the solid blue line denotes the 90th percentile limit on this axis.

estimated quantile limits for one or more cost categories, and yet have perfectly respectable aggregate costs per loop. As I have already noted the existence of such cases may be attributed to potentially complex interdependence among the expenditure groups. Without modeling these dependencies explicitly it is impossible to

draw any meaningful conclusions about aggregate inefficiency from observations on individual cost components and their marginal quantiles. Granted such component comparisons may prove to be a useful diagnostic for some carriers, but I fail to see any compelling rationale for their systematic use in regulatory rate-making.

In contrast, estimation of aggregate cost models via quantile regression of the same type that has been proposed for individual components does offer a simple and straightforward method of assessing individual carrier performance relative to their peers, and therefore would seem to be a natural alternative procedure.

4. Covariate Selection and Prediction

It is asserted in paragraph 22 of Appendix H that the inclusion of insignificant covariates in the fitted models is harmless because the intent is to "generate 90th percentile predictions, which are unaffected by the addition of insignificant variables." This assertion would seem to be based on the fact that inclusion of such irrelevant covariates does not induce bias in conventional least-squares estimates and therefore does not lead to bias in predictions. However, it should be noted that inclusion does inflate the variance of all the coefficient estimates and consequently does lead to some deterioration in performance of the predictions. The situation is essentially the same for quantile regression estimates where a similar variance inflation effect can be seen in the asymptotic behavior of the predictions.

For mean regression the usual strategy for balancing this variance inflation effect against potential bias arising from exclusion of relevant covariates involves some form of model selection like the use of the Akaike criterion. There is an extensive recent literature on analogous methods for covariate selection for quantile regression, see e.g. Koenker (2005, §4.9).

My impression based on the results of Table 1 would be that there is likely to be some gain by more parsimonious model selection in the present application.

5. Transformations and Prediction

Several advantages of quantile regression methods over more traditional least squares based methods are mentioned in Appendix H. They avoid reliance on explicit distributional assumptions, they possess an inherent robustness to extreme observations, and they permit the researcher to focus on local features of the conditional distribution of response. Another advantage of the quantile regression approach over least-squares based methods is somewhat more transparent behavior of quantiles with respect to transformations of the response variable. When, as in the present application, log transformation of the response seems appropriate, it is convenient that quantiles of the logged response are simply expressed as the logarithms of the quantiles of the unlogged response. This stands in sharp contrast to the behavior of the mean under similar transformations: if $\log Y \sim \mathcal{N}(\mu, \sigma^2)$, then the mean of Y is $\exp(\mu + \sigma^2/2)$, an expression that involves both the mean and variance of the transformed response. In non-normal settings the analysis of mean behavior under similar transformations can be considerably more complicated.

An annoying practical problem of log transformation often arises: What is to be done with observations taking the value zero? This problem appears in several of the cost models of Appendix H; the proposed treatment there is a common one, simply to add one to variables before making the log transformation. This has the obviously beneficial effect of replacing the awkward $\log(0) = -\infty$ by the apparently innocuous $\log(1) = 0$. However, we are entitled to ask, why one? Why not 0.046? This question is particularly problematic for mean regression where the eventual choice may have the effect of introducing serious outliers into the analysis. When it is the response variable that is undergoing the transformation these outliers are usually less serious in quantile regression applications. This can be seen, for example, in the Appendix figure for AS 8, where there are a significant number of points that appear as zeros after the transformation to logarithms. These points would tend to drag least squares estimates of the conditional mean function downward, and replacing the arbitrary increment +1 by a smaller value would only accentuate this impact. Quantile regression estimates are somewhat more impervious to this action: the gradient condition that determines the optimality of the quantile regression estimates depends only on the signs of the residuals, not their magnitudes, and therefore the fit depends only on how many points are below the fitted surface and their covariate values, but not on how far below they lie. Nevertheless, I would be reluctant to treat such points so casually, it seems difficult to regard them as part of the same population as the rest of the observations, and I would generally prefer treating them in some way that recognized this.

More serious problems arise for both mean regression and quantile regression when such perturbations introduce outliers in the explanatory variables. Such so-called leverage points can be highly influential in both forms of regression and can do serious damage to the fitted model. Several examples of this type arise for the covariates employed in the present analysis. In particular, 665 of the 720 observations on "blocks ua" are zero, and 529 zero values exist for "blocks uc" – replacing all of these values by zero on the log scale strikes me as a dangerous procedure.

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Appendix A. Other Cost Components

Plots of the remaining cost components with fitted values for points lying above the estimated 90th percentile surface appear below.

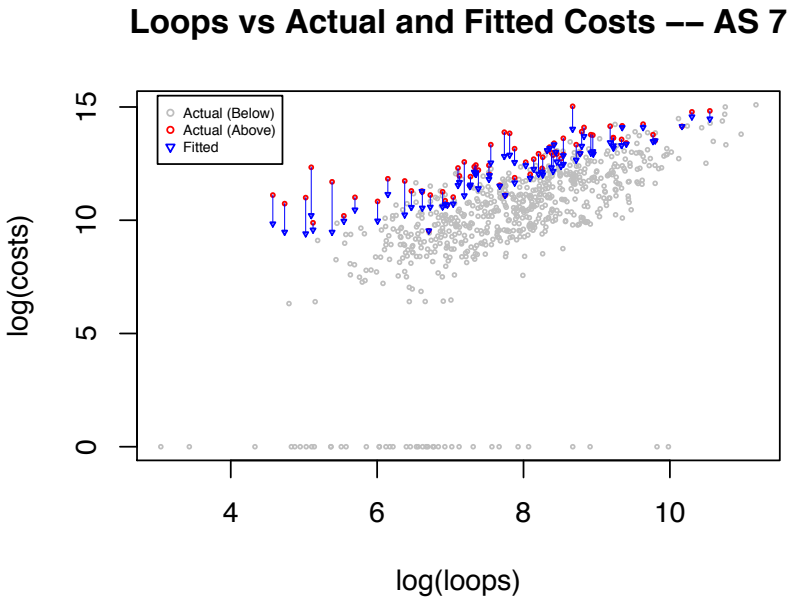

FIGURE 4. Scatter Plot of Cost Component AS 7

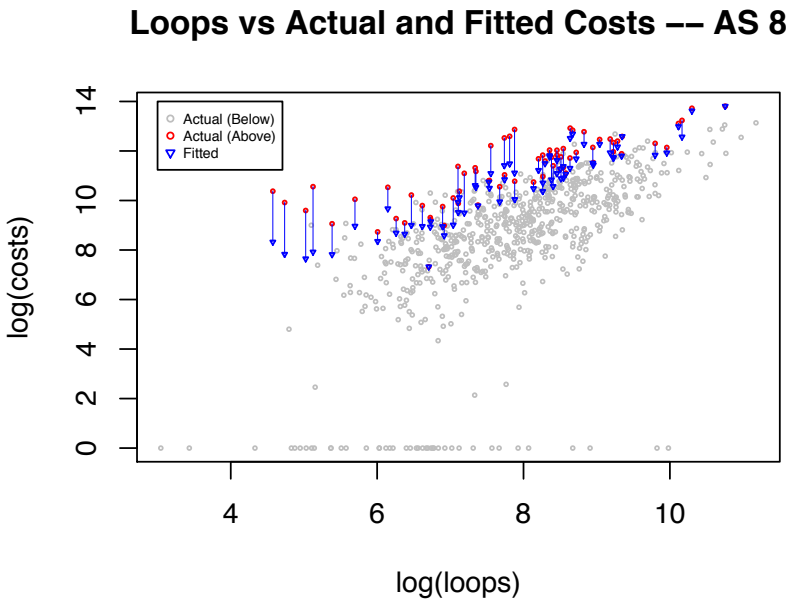

FIGURE 5. Scatter Plot of Cost Component AS 8

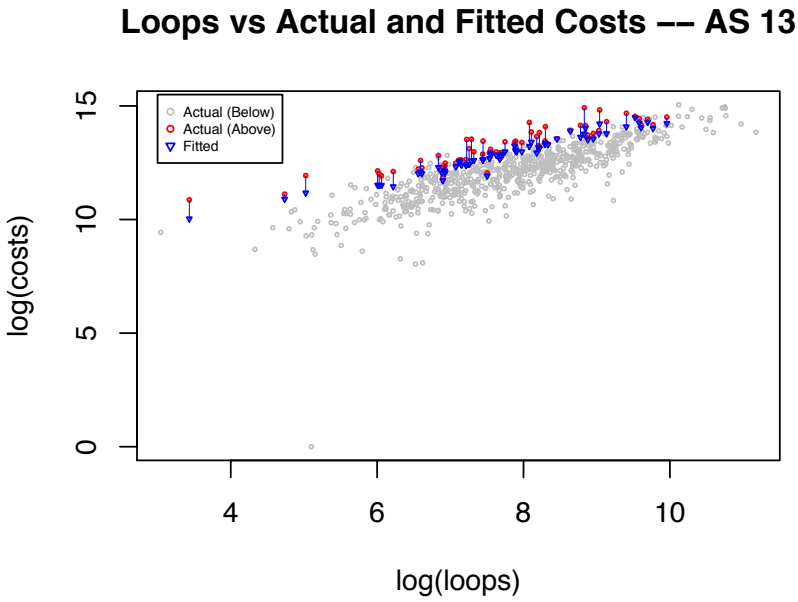

FIGURE 6. Scatter Plot of Cost Component AS 13

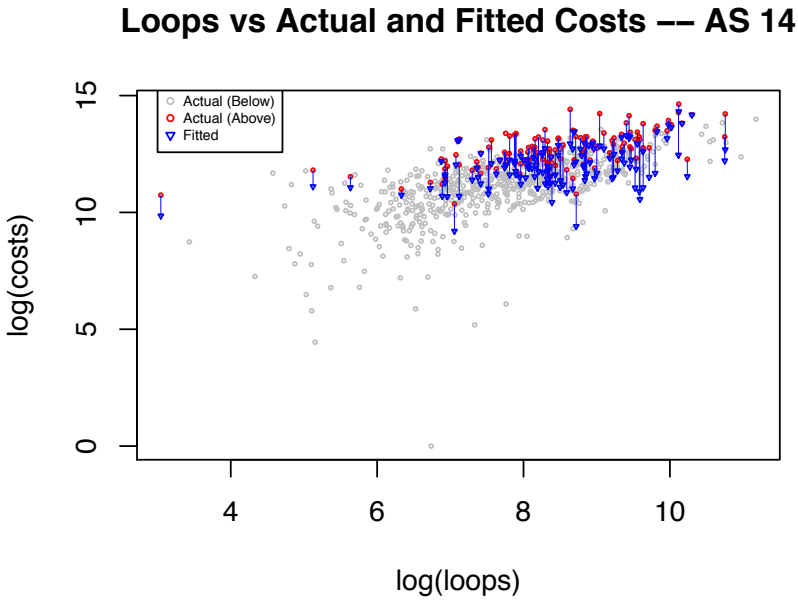

FIGURE 7. Scatter Plot of Cost Component AS 14

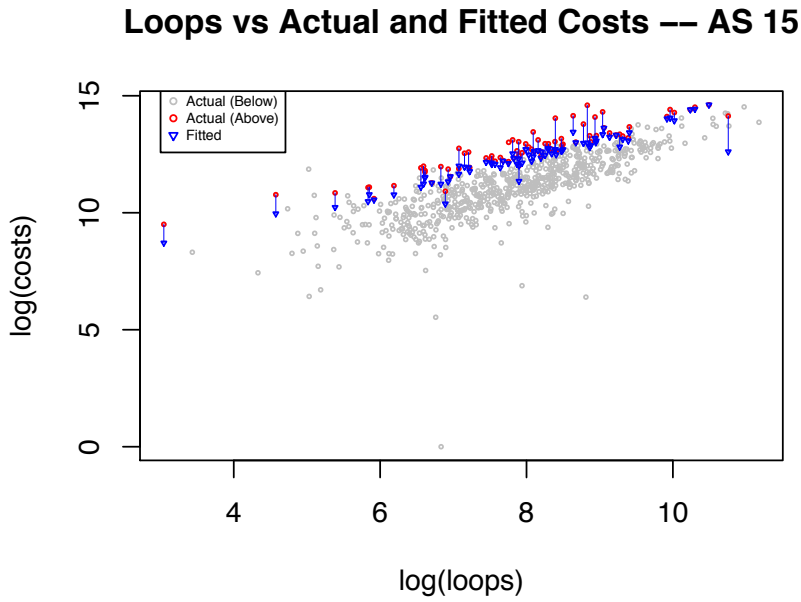

FIGURE 8. Scatter Plot of Cost Component AS 15

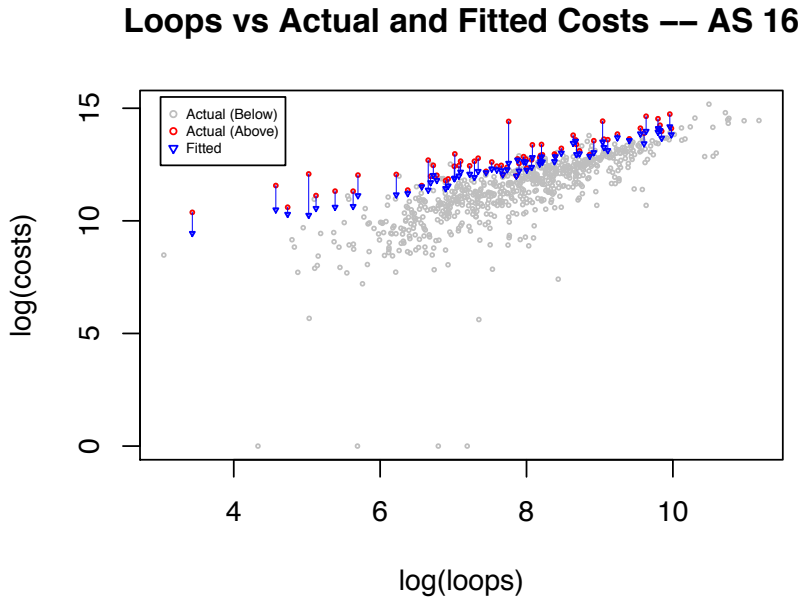

FIGURE 9. Scatter Plot of Cost Component AS 16

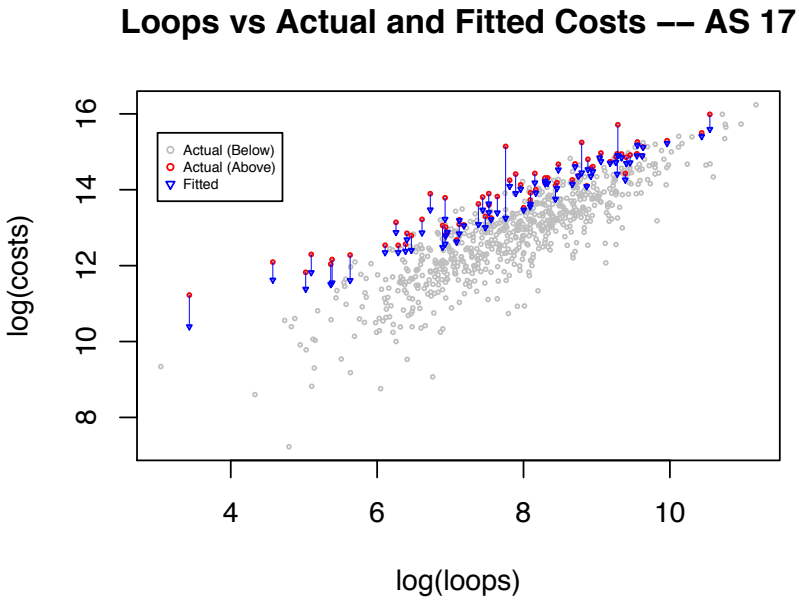

FIGURE 10. Scatter Plot of Cost Component AS 17

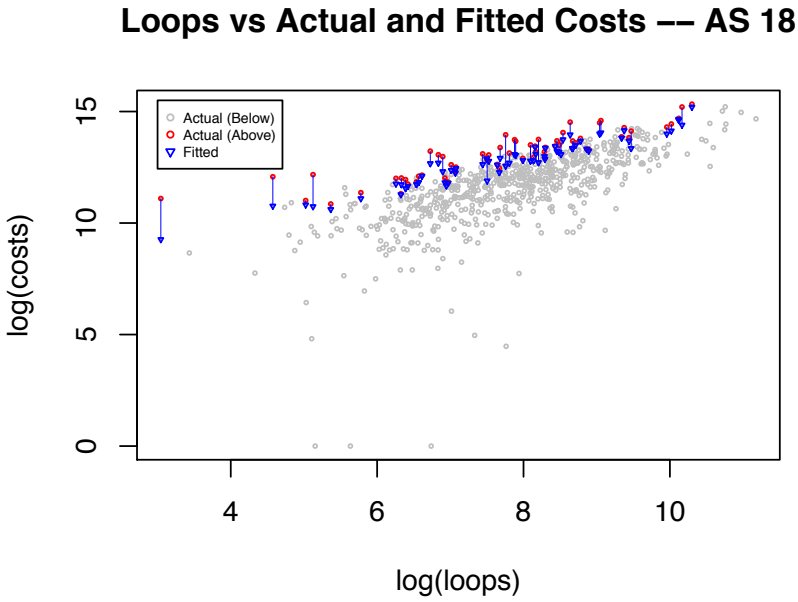

FIGURE 11. Scatter Plot of Cost Component AS 18

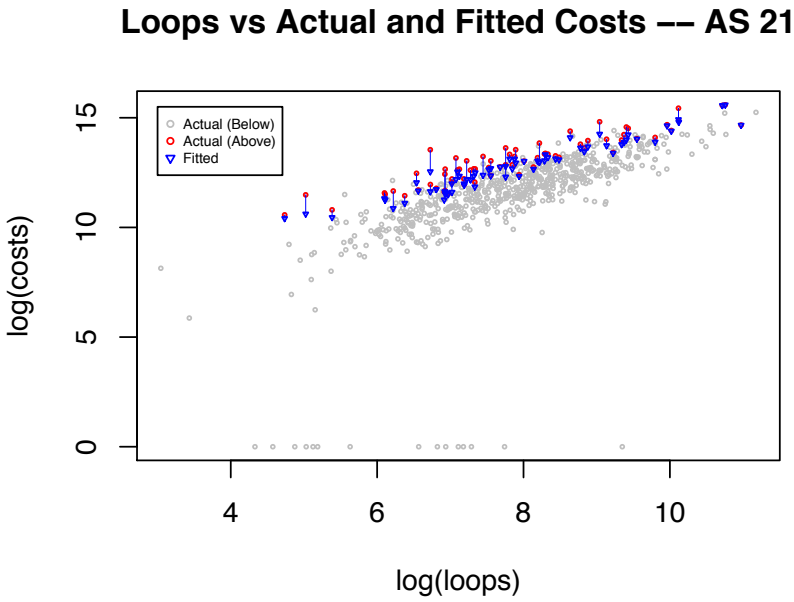

FIGURE 12. Scatter Plot of Cost Component AS 21

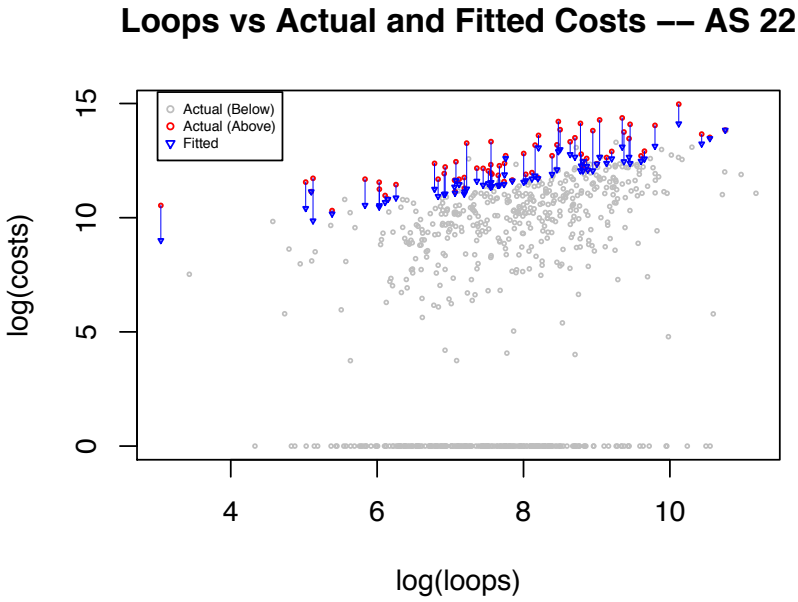

FIGURE 13. Scatter Plot of Cost Component AS 22

Appendix E-Attachment 1

Professor Roger Koenker CV

CURRICULUM VITAE

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SPECIALIZATION:	Econometric Theory and Applications
EXPERIENCE:	Assistant Professor of Economics, University of Illinois, 1974-76 Member of Technical Staff, Economics Research, Bell Telephone Laboratories, 1976-1983 Visiting Associate Professor of Economics, University of Pennsylvania, Winter 1982 Professor of Economics, University of Illinois, 1983– Professor of Statistics, University of Illinois, 1992– McKinley Professor of Economics, University of Illinois, 1997– Visiting Fellow, CEMMAP and University College London, Spring 2003 Visiting Professor, University College London, Spring 2011
EDITORIAL:	Associate Editor, *Econometrica*, 1991–1994 Associate Editor, *Econometric Theory*, 1994– Associate Editor, *Journal of Statistical Software*, 2002– Associate Editor, *Journal of American Statistical Association*, 2004–
HONORIFIC:	Fellow of Econometric Society, 1998 International Fellow, CEMMAP, 2003 Fellow of American Statistical Association, 2008 Fellow of Institute of Mathematical Statistics, 2008 Emanuel and Carol Parzen Prize for Statistical Innovation, 2010

TEACHING:

Economics Graduate Student Organization
Outstanding Teaching Award 1995-96
Economics Graduate Student Organization
Outstanding Teaching Award 1996-97
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GRANTS:

National Science Foundation, 1984-86
National Science Foundation, 1987-88
International Research and Exchanges Board, 1989
National Science Foundation, 1989-90
National Science Foundation, 1990-92
National Science Foundation, 1992-94
NATO Cooperative Research Grant, 1993-5
National Science Foundation, 1994-97
National Science Foundation, 1997-00
National Science Foundation, 2000-03
National Science Foundation, 2003-06
National Science Foundation, 2006-09
National Science Foundation, 2009-12

PUBLICATIONS:

1. Books:

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February, 2010

CERTIFICATE OF SERVICE

I hereby certify that a copy of the Associations' Comments was served this 18th day of January, 2012 by electronic filing and e-mail to the persons listed below.

By: /s/ Elizabeth R. Newson
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