Jeffrey S. Lanning
Vice President - Federal Regulatory Affairs
1099 New York Avenue NW
Suite 250
Washington, DC 20001
202.429.3113
jeffrey.s.lanning@centurylink.com

VIA ECFS

REDACTED – FOR PUBLIC INSPECTION

SUBMISSION FOR THE RECORD

March 31, 2014

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: *Connect America Fund; A National Broadband Plan for Our Future; High-Cost Universal Service Support; Federal-State Joint Board on Universal Service*, WC Docket No. 10-90; GN Docket No. 09-51; WC Docket No. 05-337; CC Docket No. 96-45

Dear Ms. Dortch:

Following on recent meetings with FCC staff from the Wireline Competition Bureau, CenturyLink hereby files the attached Submission for the Record re: Preliminary Network Engineering Analysis of CAF II Build Cost for CenturyLink. By this filing, CenturyLink submits for the record a more thorough discussion of the preliminary results of an internal network engineering analysis that CenturyLink conducted and which was the subject of an ex parte notice filed on March 27, 2014.

The attached document, which contains confidential information, is being filed pursuant to the August 30, 2012 Third Protective Order in WC Docket Nos. 10-90, *et al*.[1] Pursuant to the Third Protective Order, the non-redacted version of the document is annotated as follows: "**CONFIDENTIAL INFORMATION – SUBJECT TO PROTECTIVE ORDER IN WC DOCKET NOS. 10-90, 07-135, 05-337, 03-109, GN DOCKET NO. 09-51, CC DOCKET NOS. 01-92, 96-45, WT DOCKET NO. 10-208 BEFORE THE FEDERAL COMMUNICATIONS COMMISSION**".

[1] 27 FCC Rcd 10276 (2012).

One copy of the non-redacted version of this filing is being submitted in hard copy to the Office of the Secretary. An extra copy is included to be stamped and returned to the courier. Additionally, two hard copies of the non-redacted version of the submission are being transmitted to Alexander Minard of the FCC's Wireline Competition Bureau. A redacted version of this submission, which includes this same cover letter and appends a copy of Submission for the Record with the confidential information omitted, and which is annotated "**REDACTED – FOR PUBLIC INSPECTION**", is also being simultaneously filed today via ECFS in the above-referenced dockets.

If you have any questions regarding this Submission for the Record, please contact me at 202-429-3113.

Sincerely,

Attachment

Copy via email to:
Carol Mattey
Alexander Minard
Ryan Yates
Steve Rosenberg

CenturyLink Submission for the Record re: Preliminary Network Engineering Analysis of CAF II Build Cost for CenturyLink

As described in the ex parte notice filed in this docket on March 27, 2014, CenturyLink met with Wireline Competition Bureau staff this week to discuss the preliminary results of an internal network engineering analysis CenturyLink has conducted. In this letter, CenturyLink submits for the record a more thorough discussion of the preliminary results. While these results are only preliminary, they raise several points the Bureau should consider as it proceeds with implementation of the Connect America Fund, Phase II (CAF II), including adoption of the Connect America Model (CAM) that will be used to allocate CAF II support. Accordingly, CenturyLink offers several ideas for possible interpretations and/or rule changes to improve the prospects for a successful program.

After Connect America Model (CAM) version 4.0 was released in December 2013, CenturyLink's network engineering team developed an estimate of the actual cost to construct a network that could satisfy Connect America Fund, Phase II (CAF II) obligations. The CAM and the inputs upon which it relies had become sufficiently developed and stable to invest the considerable time and resources involved in conducting a real-world analysis of what would be required to build a network if CAM 4.0 were used to identify the areas eligible for support.

In this paper, CenturyLink summarizes its analysis, the results, and some possible solutions. First, we explain that CAM 4.0 illustrative results differ significantly from those produced by prior iterations of the CAM, and the negative implications of this shift for the success of CAF II. We then describe the network engineering analysis done by CenturyLink, which found: (1) the newly eligible CAF II locations (which used to be in areas for the Remote Areas Fund) are extremely high-cost, both in terms of low-density and isolation from other network facilities; (2) that there are economic challenges to sharing network cost in these remote areas, and that the funding period may be too short; (3) and that the cost problems appear to be associated with the recently-added extremely high-cost CBs. Finally, we discuss some things the Commission and/or Bureau can do to address these problems, such as restoring eligibility to the unserved locations in these CBs, and better aligning the funding period with the required build-out obligation.

***CAM 4.0 Illustrative Results*.** CAM 4.0 proposed to use the $1.75 billion in annual funding that is budgeted for CAF II to bring broadband with speeds of at least 4 Mbps downstream and 1 Mbps upstream to approximately 4.3 million high-cost locations that are not in Census Blocks (CBs) shown as served (with at least 3 Mbps downstream and 768 kbps upstream) on the National Broadband Map. The specifications for the CAM 4.0 distribution were:

- Funded locations: 4,300,775
- High-Cost Threshold: $52 (average cost per month for every location in the CB)[1]
- Extremely-High-Cost Threshold (funding cut-off) $176.63
- Remote Areas Fund (RAF) locations: 638,290 locations
- RAF percentage: 0.41% (of locations in CBs served by Price Cap carriers)

For CenturyLink, the CAM 4.0 distribution of potential support yielded:

- CenturyLink locations: 1,107,290 (locations in CBs served by CTL as a price-cap ILEC)
- CenturyLink annual funding: $484,523,246 (subject to state-wide offers of support)
- RAF locations: 207,178

The distribution of locations that would be eligible for CAF II support has changed substantially during development of the CAM. More sparsely populated locations that had been reserved for the Remote Areas Fund (RAF) have been replacing somewhat more populated high-cost areas in the universe of potentially-eligible CAF II locations. The magnitude of this change can be seen in the following table.

	High-Cost Benchmark	Extreme HC Benchmark	Funded Locations	RAF Locations	RAF Percentage
CAM 3.1.2	$50.00	$178.46	4,429,687	**BEGIN CONFIDENTIAL [ ]END CONFIDENTIAL**	**BEGIN CONFIDENTIAL [ ]END CONFIDENTIAL**
CAM 3.2	$52.00	$176.63	4,528,938	≈ 1,540,000	≈ 1.00%[2]
CAM 4.0	$52.00	$197.14	4,300,775	638,290	0.41%
CAM 4.1	$52.50	$203.98	4,220,748	598,257	0.39%

For CenturyLink these changes are shown in the following table:

[1] The current high-cost benchmark of $52.50 per location passed correlates with a very high level of monthly revenue needed to break-even. Generally, only 90% of locations are occupied and if, as the CAM assumes, 80% of those become subscribers at some point during the five-year build-out period, then a provider would need to receive more than $80 per customer to cover the high-cost benchmark.

[2] Footnote 31 of the Public Notice for CAM 3.2 explains that the $52 High-Cost Benchmark yielded greater than 1.00% of all locations above the Extremely High-Cost Benchmark, and subsequent Public Notices have shown there to be 153,990,014 locations in CBs served by Price Cap ILECs.

	High-Cost Benchmark	Extreme HC Benchmark	CTL Funded Locations	CTL RAF Locations	CTL RAF Percentage	CTL Funding
CAM 3.1.2	$50.00	$178.46	1,161,424	n/a	n/a	$468,252,916
CAM 3.2	$52.00	$176.63	1,171,659	n/a	n/a	$481,196,629
CAM 4.0	$52.00	$197.14	1,107,290	207,178	0.75%	$484,523,246
CAM 4.1	$52.50	$203.98	1,113,798	195,376	0.71%	$497,331,812

It is evident that the primary cause for this large shift in the numbers of locations and geographic areas eligible for CAF II funding has been the incorporation of newer versions of the National Broadband Map. There have been some substantive changes to CAM over the past year as these iterations of the model have been developed, but those changes have been relatively small and limited in their effect on modeled costs. During the same time period, however, unsubsidized competitors as a group have claimed they serve substantially more CBs on the National Broadband Map.

Unsubsidized competitors are predominately cable companies and wireless Internet service providers (WISPs), the latter of which generally (but not always) are small businesses using line-of-sight technology and unlicensed spectrum to deliver broadband. While these providers likely have made some incremental investment in high-cost areas over the past year, it is more likely that most of the increased coverage appearing on the National Broadband Map is the result of greater claims of coverage by unsubsidized competitors. This leads to two important points: (1) there are many unserved locations in these newly-ineligible CBs; and (2) the claims of increased coverage by unsubsidized competitors are largely unverifiable.

Many Unserved Locations Are No Longer Eligible for CAF II Support. The shift in the National Broadband Map has removed hundreds of thousands of high-cost, unserved households and business locations from CAF II eligibility. It is undeniable that many of the locations that have recently been deemed ineligible for CAF II funding do not actually have access to broadband. Many of the newly-served CBs are reported as only partially-served which, nonetheless, results in all of the locations in the CB being excluded from CAF II eligibility. Indeed, as CAF II is currently constructed, a CB is removed from eligibility if just one location in the CB is reported as served.[3] Therefore, it is possible, and even likely, that hundreds of thousands of unserved homes and businesses have been excluded from CAF II eligibility and the promise of broadband coverage over the past year. CenturyLink's analysis, described below,

[3] What's more, the served location is not measured at 4 Mbps downstream and 1 Mbps upstream, but rather at the substantially less costly to serve threshold of 3 Mbps downstream and 768 kbps upstream.

demonstrates that the exclusion of so many locations from CAF II is potentially quite damaging for the policy goals of the Communications Act and the Commission.

The Claims of Increased Coverage by Unsubsidized Competitors Are Largely Unverifiable. The process for reporting broadband coverage to create the National Broadband Map is voluntary. There are no penalties for making erroneous coverage claims (either overstated or understated), which is part of the reason the Commission will undertake a challenge process before finalizing the list of eligible CBs for CAF II. It is also clear that the CAF II challenge process is likely to be very unwieldy and challenging to administer, as evidenced with the challenge process for the much smaller and shorter CAF I Incremental Support program in 2013. Accordingly, the shift in eligibility may well prove to be unverifiable in practice.

A Network Engineering Analysis of the Cost to Build the Required Network. When CAM 4.0 was released, CenturyLink's network planning team initiated an analysis of the cost to build the required network. This analysis relied on engineering records, inventories, loop qualification data, and other network planning tools. The results were verified with the local planning teams.

New CAF II Eligible Locations Are Extremely High-Cost. Many of the unserved households that have moved from the RAF to CAF II eligibility are, in reality, extremely high-cost and uneconomic to serve, even with the amount of support identified in the CAM. Like all models, the CAM surely has challenges replicating real-world experiences in the extreme cases, which deviate considerably from the normal situation. Some cost modeling assumptions that are reasonable and correct in nearly all cases no longer translate to real-world economics.

CenturyLink's analysis raises several questions about the CAF II obligations, eligible locations, and funding parameters for Commission staff to consider, if CAF II is to be successful. Specifically, there appear to be higher-than-expected numbers of sites (points of aggregation) that cover just a few locations. Similarly, there appear to be more instances than expected where normal assumptions regarding the economics of sharing feeder facilities may not apply in practice because of the uneconomic, remote nature of the areas served. Finally, the magnitude of the required capital expenditure in some cases may not be aligned with the available funding, both in amount and duration.

Extremely Low-Density CBs. CenturyLink's network engineering analysis revealed a disproportionately large, and economically damaging, number of CAF II eligible locations that can only be served through very sparsely-populated sites (points of network aggregation where feeder plant connects to distribution plant). The CAM 4.0 distribution would require CenturyLink to deploy **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** sites **BEGIN**

CONFIDENTIAL([ ]**END CONFIDENTIAL** of the total required) to serve just **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** eligible locations **BEGIN CONFIDENTIAL**([ ]**END CONFIDENTIAL** of the total), and account for over **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** billion in capital expense **BEGIN CONFIDENTIAL**([ ]**END CONFIDENTIAL** of the total), which translates to an average capital expenditure of **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** per location. The average density of these **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** sites is just **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** locations per site, and most of them have just 1 or 2 locations per site.

Isolated CBs. The network engineering analysis also revealed that many of the eligible CAF II locations are now far removed from other eligible locations, which requires the expenditure of substantial capital expenditure just to build the route to the site serving the eligible locations. That expenditure will be shared exclusively by the locations at that single site, which generally makes the route uneconomic. The CAM 4.0 distribution would require CenturyLink to deploy **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** routes **BEGIN CONFIDENTIAL**([ ]**END CONFIDENTIAL** of the total) serving just 1-3 sites, each of which has fewer than 20 locations per site. Those routes would reach just **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** CAF II eligible locations **BEGIN CONFIDENTIAL**([ ]**END CONFIDENTIAL** of the total CenturyLink eligible), and yet they would generate just under **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** million in capital expenditure (nearly **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** of the total CenturyLink capital expenditure for CAF II).

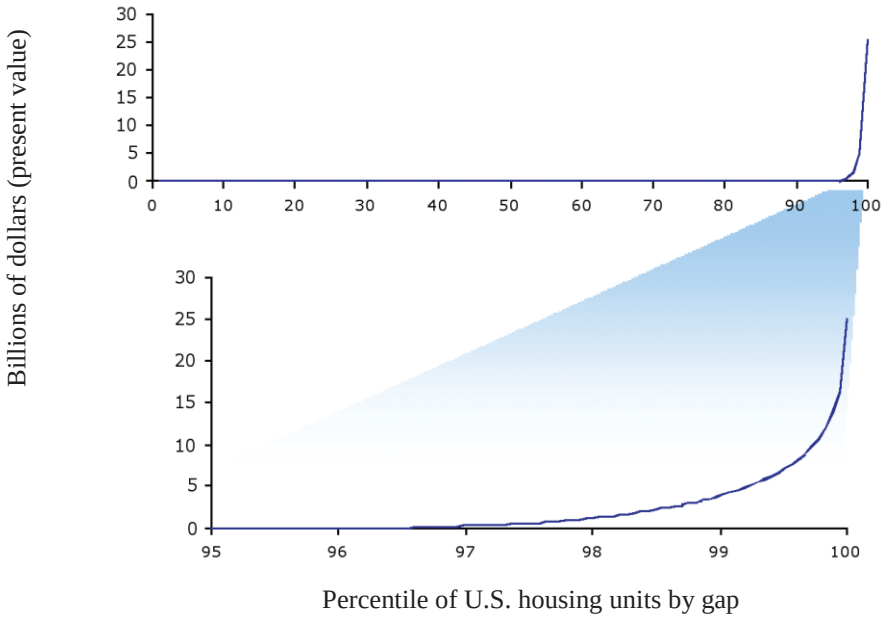
Problems with Sharing Network Cost. Many miles of feeder fiber are needed just to reach the sites (points of aggregation) for connecting with distribution facilities reaching customer locations. The CAM assumes the cost of the fiber feeder should be shared with all other locations that it passes on the way to the funded locations in the remote CB. This is a reasonable and nearly always correct modeling assumption. In the extreme case where deployment is reaching remote locations far apart from each other, it no longer correlates with the economics of real-world deployment because many, indeed most, of the locations that are passed are themselves high-cost and uneconomic to serve. If they are not also funded, which is increasingly the case with the overstated coverage in the updated National Broadband Map, it is not economically rational to make the investment to serve the shared locations with broadband because the operating costs in these areas exceed potential revenue. By way of analogy, it is frequently impossible to improve the economics of one store that is losing money by constructing another money-losing store with which to share capital expenses.

The Five-Year Funding Period May Be Too Short. The duration of high-cost support--the funding period -- is another area where the CAF II funding parameters do not work in the extremely high-cost locations that have been added as a result of changes in the National Broadband Map. The largest capital expenditure component involved in deploying a broadband network is the fiber feeder needed to reach the sites for connecting with distribution plant. In more remote locations, the percentage of the total investment that goes to fiber feeder increases. In the CAM, the useful life of these investments is estimated at 25 years, so the capital expenditures involved in constructing the network are depreciated over 25 years. The funding period is only 5 years, however, which means that 80% of the support needed just to break even on the fiber investments will not be provided under the current funding parameters. In turn, this requires a network operator accepting a CAF II offer of support to bear the risk that additional funding will not be available after the initial five-year period.

Finally, the proposed CAF II distribution, on its face, raises an additional question about the current CAF II funding parameters. The CAM estimated capital expenditure required to deploy a network is substantial. For CenturyLink, CAM 4.0 estimates total network investment of $**BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL** billion. If the capital expenditure actually needed to meet the obligations associated with the first five-year funding period even approaches a comparable figure, it will risk crowding out other investments that CenturyLink must make just to maintain its current business. Currently, CenturyLink makes approximately $3 billion in capital expenditures each year across the entire enterprise. A **BEGIN CONFIDENTIAL**[ ]**END CONFIDENTIAL**% increase in that amount on the part of CenturyLink is likely to problematic given its current capital structure and operational capabilities. The same is likely true for other potential CAF II funding recipients, both through the initial state-wide offers and the competitive bidding process. This suggests that a five-year funding period and, in particular, the obligation to complete 85% of the build-out within three years may be too aggressive. A longer funding period, even with significantly higher speed requirements may be more consistent with the economics of the high-cost areas for which CAF II funding is intended.

The Economic Challenges Appear to be Related to the Recently-Added Extremely High-Cost Locations. The CBs that have been recently added to the CAF II distribution appear to have an average of fewer than two living units in them, and they span tens or even hundreds of square miles in area. This inevitably increases the cost of deployment and maintaining broadband service, and the increase is exponential rather than linear as shown in the National Broadband Plan.

National Broadband Plan Exhibit 8-C[4]



This economic challenge to the deployment of robust terrestrial broadband in the most remote locations led the staff of the National Broadband Plan to recommend that they be served by alternative technologies. Similarly, the Commission established the RAF precisely for the purpose of addressing the challenges of broadband deployment in these areas, and advised the Bureau to dedicate up to, but "not more than one percent"[5] of locations for the RAF. The current distribution of locations is not even balanced at the mid-point of this range but, rather, is skewed toward including these extremely high-cost locations in the CAF II program.

Some Modifications the Bureau Should Consider. The analysis in this document should not be taken to mean that the CAM and CAF II are fatally flawed. Far from it. Instead, the logical conclusion is that the Bureau and/or Commission may want to consider one or more targeted adjustments to the CAF II eligibility criteria, funding parameters, or other obligations to account for the fact that changes in the National Broadband Map have led to extremely high-cost CBs being included in CAF II eligible areas. CenturyLink proposes further investigation of the following potential modifications.

---

[4] Federal Communications Commission (staff report), *Connecting America: the National Broadband Plan*, at 138 (March 26, 2010) available at http://www.broadband.gov/.

[5] *USF/ICC Transformation Order*, 26 FCC Rcd at 17837-38 ¶ 533; *see also*, Public Notice: Wireline Competition Bureau Announces Availability of Version 3.2 of the Connect America Fund Phase II Cost Model, and Illustrative Results; Seeks Comment on Several Modifications for Non-Contiguous Areas, 28 FCC Rcd 12833, 12841 fn. 31 (2013).

- **Make Partially-Served High-Cost CBs Eligible for CAF II.** The analysis above demonstrates that a primary driver of increased cost for a CAF II build-out has been the recent expansion of claimed broadband coverage in the National Broadband Map. Given the parameters for reporting coverage on the National Broadband Map, it is certain that hundreds of thousands of unserved locations have been deprived the opportunity to benefit from CAF II funding. This public interest harm could be offset in significant measure by making partially-served high-cost CBs eligible for CAF II funding. Where the issue of CAF II eligibility is raised by any party in the challenge process, unsubsidized competitors should have the evidentiary burden of showing 50% or greater coverage of the CB or network deployment plans to achieve it. Given the challenging (at best) economics of these high-cost CBs, CAF II funded providers should be required, and indeed would have the incentive, to seek waivers from building out to any already served locations in the CBs.
- **Enhance the Operation of the Substitution Rule**. As demonstrated above, a large share of the cost challenges with the CAF II distribution stem from the obligation to build out to sparsely populated and isolated CBs. This could be ameliorated significantly if CAF II recipients were able to work with an enhanced substitution rule that would permit them to substitute any high-cost locations that are not served by unsubsidized competitors, without regard to the eligibility status of the CB in which those locations are found.
- **Freeze the Extremely High-Cost Benchmark and Allow the High-Cost Benchmark to Adjust to Meet the CAF II Budget**. In the simplest terms, the core problem with the CAF II distribution as currently constructed is that there are too many CAF II eligible locations that used to be covered by the RAF and, indeed, should still be addressed through the use of alternative technologies. One clean-cut approach to solving the problem would be to freeze the Extremely High-Cost Benchmark at some level between 750,000 locations (0.5% of price cap locations) and 1,500,000 (1.0%) locations. If, for example, the highest cost 1,000,000 locations were designated for the RAF, the $1.75 billion annual budget for CAF II could be allocated by adjusting the high-cost benchmark downward below $52.50 per location passed. As described above,[6] the current benchmark requires a very high level of average revenue per customer -- over $80 per month -- which suggests that locations below the high-cost benchmark are still very high cost in nature. Moreover, the fact that those locations would, by definition, be in CBs that are not served by unsubsidized competitors means that there are real-world challenges to broadband deployment that are likely to require additional CAF support.

[6] Note 1, *supra*.

- **Grant Waivers of Build-Out Obligations to Sparsely-Populated Sites and Isolated Routes**. The uneconomic impact of being required to build out to sparsely populated and isolated CBs might be ameliorated if the Commission were to presumptively grant waivers of build-out obligations and permit CAF II recipients to return CAF II funding associated with CBs containing fewer than a handful of locations or routes serving fewer than a couple of sites.
- **Create a Renewal Expectancy for Substantial Progress Toward Significantly Higher Speeds**. Another approach to addressing the economic challenges associated with the CAF II deployment obligation while also addressing the public interest in higher-speed broadband would be to create a renewal expectation at the same funding level for CAF II recipients that demonstrated substantial progress toward deployment at significantly higher speeds. For example, a CAF II recipient could anticipate renewing its funding for a second five-year term at the same level if it demonstrated that 50% of more of the locations in its obligated build-out could receive 10 Mbps downstream at the end of the first term.
- **Relax the Build-Out Obligation**. Another possible approach to mitigating the uneconomic impact of extremely high-cost CBs being included in the CAF II distribution would be to permit CAF II recipients to meet their build-out obligation by demonstrating 90% coverage of the eligible locations in each Census Tract.
- **Accelerate Depreciation of Long-Lived Assets to Accommodate Shorter Funding Period**. Most of the CAM model capital expenditure is associated with network elements with estimated lives of at least 25 years, yet the CAF II funding period is just 5 years, leaving CAF II recipients with considerable risk of never receiving 80% of the support needed to break even on those investments. One approach to reducing the uneconomic impact of this aspect of the CAF II funding parameters could be to reduce the depreciation life for the network inputs in the model to approximately the funding period. This would better align the capital expenditure and the CAM estimate of needed support.

Conclusion. The prospects for CAF II changed substantially for the worse with the release of CAM 4.0, specifically the incorporation of the latest versions of the National Broadband Map. The newer versions of the Map contain much greater claims of broadband coverage in high-cost areas than existed before. These new, and largely unverifiable, claims of broadband coverage have removed entire CBs, including hundreds of thousands of unserved locations because many of the new coverage claims are only for partial coverage of the CBs. Consequently, the preliminary results from a network engineering analysis of the cost to build the network to comply with all of the CAF II obligations in areas served by CenturyLink reveal some issues. In particular, the newly eligible CAF II locations (that used to be in areas for the Remote Areas Fund) are extremely high-cost, both in terms of low-density and isolation from

other network facilities and the funding period may be too short for the obligations in these areas. There are some things the Commission and/or Bureau can do to address the problems, however, such as restoring eligibility to the unserved locations in these CBs, and better aligning the funding period with the required build-out obligation.