January 24, 2011

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

Re: Engineering Review of *Description of Broadband Now Plan* in Dec. 7, 2009 letter to Marlene H. Dortch, FCC from David D. Bartlett, CenturyLink, et. al.
NBP Public Notice No. 19

Dear Ms. Dortch:

The mid-sized incumbent local exchanges carriers[1] submitted a plan that they refer to as the Broadband Now Plan (BNP) in response to the National Broadband Plan (NBP) Notice No. 19. The BNP proposes a methodology for distribution of Universal Service Funds based on loop investment. Although there are several aspects of the BNP that are not well defined, it is my intent to identify costs associated with building broadband-capable plant and how these costs related to the Universal Service Fund (USF) thresholds in the BNP.

The midsize carriers' stated goals of the BNP are to jump start broadband deployment, unlock private sector investment and increase efficiency of the USF.[2] The midsize carriers assert that implementation of the BNP will result in 95% of voice customers having access to 6 Mbps within five years.[3]

[1] CenturyLink, Consolidated Communications, Frontier Communications Corp., Iowa Telecommunications Services, Inc., and Windstream Communications, Inc.

[2] Broadband Now Plan, December 7, 2009, Page 1

[3] Id., p. 1-2.

1 Infrastructure and Bandwidth Assumptions

Of the midsize carriers' 12 million voice customers,[4] all but 1.3 million currently have access to broadband, although not always at the 6 Mbps stated goal.[5] The customers are categorized as follows:

1. Customers with broadband speeds of at least 6 Mbps
2. Customers with broadband, but at speeds less than 6 Mbps
3. Customers without access to broadband

The BNP assumes upgrading customers' broadband entails deploying fiber deeper into their networks to deploy electronics located within 12,000 feet of the customers' premises, while retaining the existing copper cable between the fiber-fed terminal and the customer.[6]

2 USF Proposal

The BNP proposes that USF be distributed as follows:

- If the customer does not have access to broadband, the BNP proposes that universal service cover the investment to provide 6 Mbps broadband, but only after the carrier <u>invests $800 per household</u>.
- If the customer currently has broadband, but not at the 6 Mbps level, the BNP proposes that universal service cover the investment to provide 6 Mbps broadband, but only after the carrier <u>invests $50 per household</u>.
- Price cap-regulated carriers could be able to obtain USF support on a one-time basis for wire centers where the forward-looking cost is greater than 2.75 times the national average cost per line.[7] The calculation of universal service support would be calculated at a wire center level.[8]
- Universal service funding would be provided on a competitively neutral basis and be available to other carriers that could provide the broadband service at a lower cost if the other carrier agreed to be the facilities-based COLR in the wire center.

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[4] Id., p. 1.

[5] The 6 Mbps broadband requirement in the BNP is inconsistent with the 4 Mbps broadband requirement found in the Federal Communications Commission, Connecting America: The National Broadband Plan, released Mar. 16, 2010.

[6] Id., p. 4.

[7] Id., Attachment, p. 1.

[8] Id., p. 4.

The BNP also proposes changes to intercarrier compensation that are beyond the scope of this paper.

3 Analysis and Conclusions

The BNP does not claim that the cost to upgrade a household to receive broadband is $800, but rather that a carrier should not be required to invest more than $800 per a customer. Rather, investments over $800 per location should be paid for with universal service funds. The BNP assumes that much of the existing copper in the carrier's network is adequate for providing broadband service. Assuming the copper is relatively new and in good shape, broadband speeds of 6 Mbps can be reasonably achieved within 12,000 feet of a node.[9] For customers currently served on copper cable shorter than 12,000 feet from a node, 6 Mbps can be delivered by the addition of electronics.

- Assuming that the node can accommodate additional electronics, the cost would be $50-$100 per customer. The cost per customer could be more if the node itself must be upgraded. Such upgrades could include additional rack space, an upgraded HVAC system, additional batteries, or an upgraded power board.
- When new field electronics are needed, the cost is between $20,000 and $300,000 per terminal depending upon the number of DSL customers being served. If a hut, rather than a cabinet, must be used, the costs could be significantly more. In addition, fiber from the central office to the field terminal must be constructed. The cost of fiber construction in town is between $15-$20 per foot, or $80,000 to $100,000 per mile, and $15,000 to $30,000 per mile in rural areas. Other costs, such as engineering and taxes would also be incurred, but are not included in the above estimates.

Town Construction Costs:

As shown in Figure 1, node can provide 6 Mbps broadband to 2,000 or more customers in towns. If a cabinet were to be installed for this node, it would cost at least $330,000, which would result in electronics cost of $165 per customer. To connect this cabinet to the closest existing node, at least 20,000 feet of fiber would need to be installed. Assuming fiber construction cost to be $20 per foot, the total fiber cost would be $400,000 or $200 per customer. The cost per customer to deploy this new town cabinet would thus be $365 per customer, $165 for electronics and $200 for fiber. There are other costs that were not considered in this analysis such as acquisition of land and installation of commercial power, but are typically much smaller than the cost of the fiber and node.

[9] A node is either a central office or a cabinet or hut located in the field.

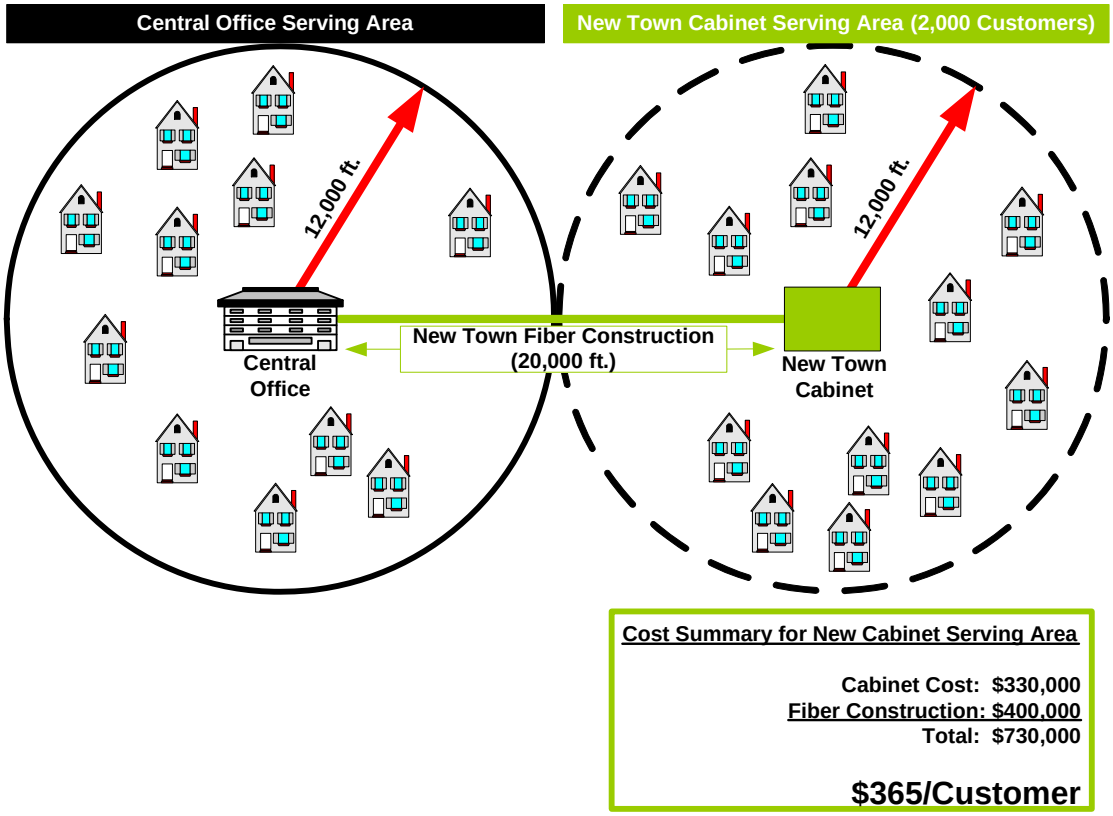


Figure 1. Example Town Construction Costs

Densely Populated Rural Area Construction Costs:

As shown in Figure 2, in a relatively densely populated rural area with approximately seven customers per square mile, a rural node would serve 100 customers within a 12,000 feet serving area. If a field cabinet were used, the cost would be approximately $30,000 and the cost per customer would be $300 for the node. If the rural fiber construction cost is $20,000 per mile and the distance is four miles to connect the node, the fiber cost per customer would be $800. The total cost per customer to provide broadband to these customers would thus be $1,100.

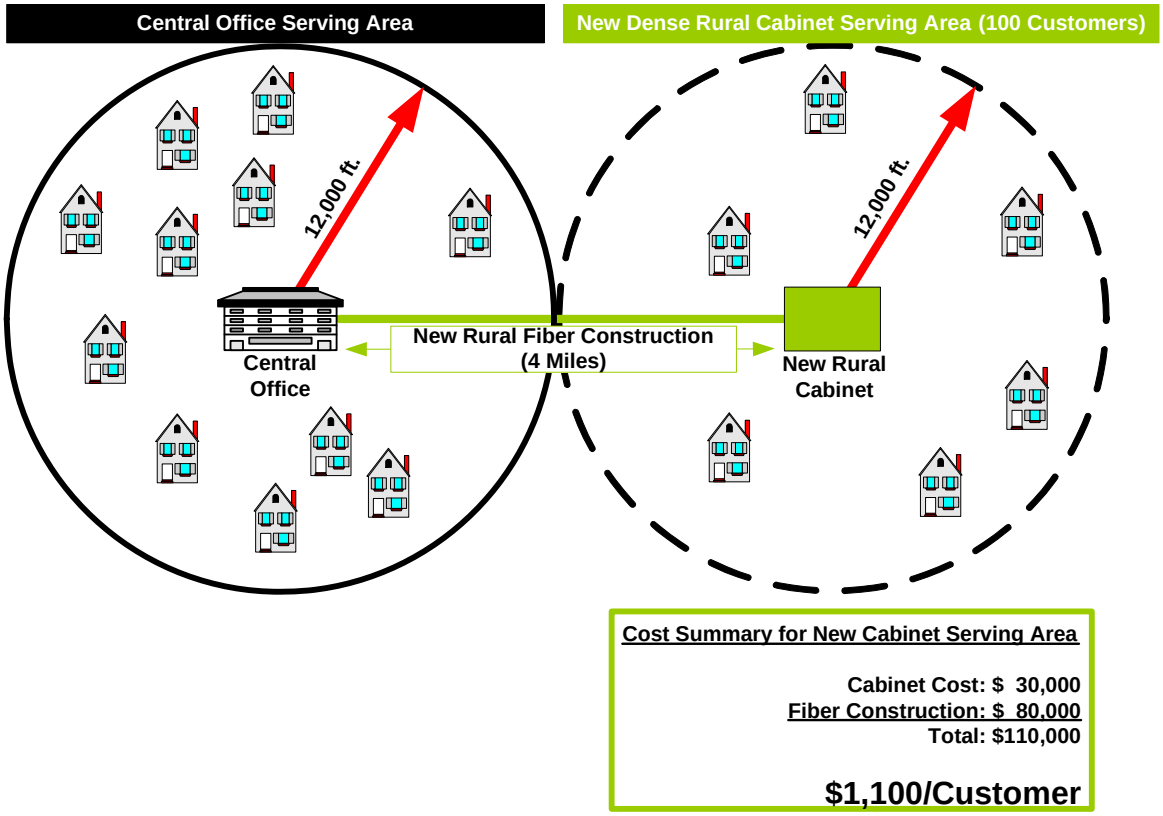


Figure 2. Rural Construction Costs for 7 Customers per Square Mile

Sparsely Populated Rural Area Construction Costs:

In many rural states with customer densities of less than one per square mile,[10] a rural node with a serving area of 12,000 feet would serve ten or fewer customers. This scenario is shown in Figure 3. If a cabinet were used which served ten customers and cost $20,000, the electronics cost per customer would be $2,000. Four miles of fiber at $15,000 per mile to connect the terminal would cost $60,000 or $6,000 per customer. The total cost per customer is thus $8,000.[11]

[10] States such as Nebraska, South Dakota, North Dakota, Montana and Wyoming have low customer densities.

[11] In extremely rural areas such as these, Fiber-to-the-Premise (FTTP) technology is frequently a less expensive alternative. Although FTTP requires more fiber construction, the electronics cost per customer is less than $500. The cost of fiber construction is quite variable and might be much higher than $15,000 per mile if plowing in areas with difficult soils or environmental issues.

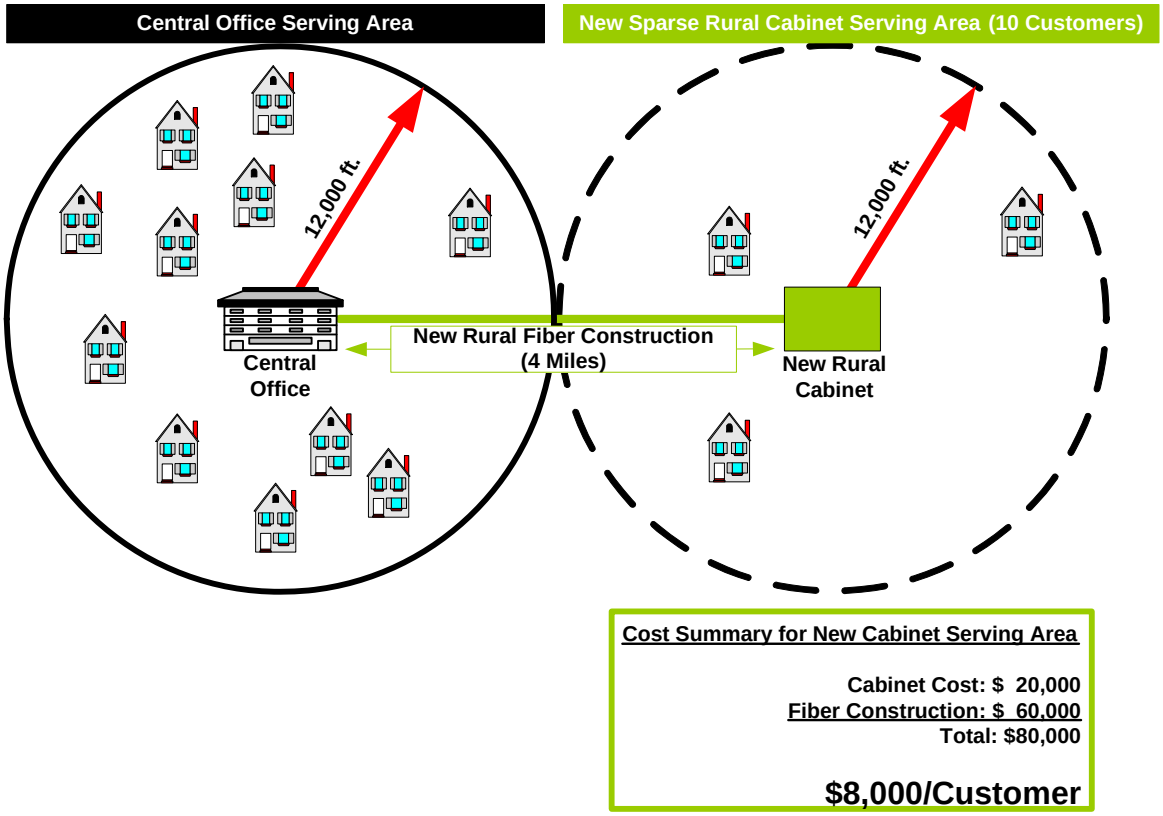


Figure 3. Rural Construction Costs for 1 Customer per Square Mile

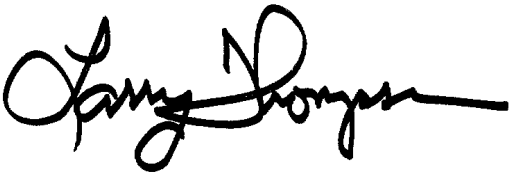
From a technical perspective, there does not appear to be any rational basis for the BNP to use $800 per location as a threshold for USF support. As shown above, the initial capital investment for many town applications would be less than $800 per location, but rural capital investments can be significantly higher. Although there are many unanswered questions raised by the BNP, I am particularly concerned with two aspects of the plan. First, the copper cable in many rural carriers' networks was installed more than 30 years ago when plant was upgraded from multi-party to single-party service. This cable is beyond its expected life and must be replaced in the near future, in which case the costs are significantly more than the estimates above. Second, the BNP addressed only the initial capital expenditures of deploying broadband and did not include any operating expenses, so it is unclear how, or if, these expenses would be covered by universal service. Maintenance expenses increase significantly as cable ages. Moreover, the more rural the area served, the higher the operating expenses because there are more facilities to maintain, more labor expense associated with maintenance, upgrades, and fewer customers to spread recurring costs.[12] A fixed reimbursement for capital investment costs without

[12] Such as commercial power for the field terminal electronics.

regard to the characteristics of the area served seems unreasonable. Even with assistance for capital expenditures, some rural areas have so few customers that universal service funding should also cover operating expenses to maintain comparability.

Finally, the BNP's proposal to base universal service funding on individual wire center costs could significantly increase the USF. Historically, carriers have been required to average their costs across high- and low-cost wire centers. Determining cost at a wire center level will likely result in many more wire centers receiving funding.

Sincerely,



Larry Thompson, PE
Chief Executive Officer
Vantage Point Solutions

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Rohit Dixit
Patrick Halley
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