



Leading the Way to Tomorrow's Internet

The Corporation for Education Network Initiatives in California

## Response to Public Notice Regarding Cost Estimates for Connecting Anchor Tenant Institutions

Corporation for Education Network Initiatives in California (CENIC)

October 28, 2009

Response is provided below to questions related to the costs of connecting anchor tenant institutions, such as public schools and libraries, community colleges and hospitals for the purposes of broadband deployment.

1. Are there other categories of buildings that should be considered anchor institutions?

Anchor institutions should also include four year colleges and Universities, including research Universities.

2. How well do the four categories of population density segment anchor institutions? Is there a need to further divide, for example, the rural grouping (<1000 persons per square mile) to treat more remote areas differently?

The four categories are not adequate to account for the disparity in the costs of providing telecommunications services to anchor tenants. As described in the attached document, the distance to major external Internet connection points and the terrain are more relevant to the cost of connecting libraries or anchor tenants than the proposed population-based segmentation. For example, a suburban or urban community in a mountainous area might be more costly to provide fiber to than a sparsely populated community in a flat terrain.

3. How accurate is the assumption that 80% of anchor institutions lack fiber? Does it vary across the different population-density groups? Does it vary by type of anchor institution?

In California, if the question is how many anchor institutions own their own fiber into their buildings, the number would be much lower, perhaps between 1 and 2%. If the question is whether there is fiber running past anchor tenant institutions, even if owned by telecommunications carriers, the numbers would likely be at least 90%.

4. To what extent are the cost estimates for bringing fiber to the individual buildings accurate?

Please see the attached for input on questions in section 4.

5. What incremental inside-wiring or campus-wiring costs should be added to these estimates? For what type of institutions in what geographies?

K-12: Based on estimates in California, for 35% of these institutions, add \$30,000 per school or approximately a total of \$105M.

CCC: Based on estimates in California, for 20% of these 110 institutions, add \$30,000 per building, with an average of 10 buildings per site needing additional wiring, for a total cost of \$6.6M.

Colleges and Universities: Based on estimates in California, for 50% of the 35 major institutions, add \$250,000 per building for wiring to on average of 10 buildings per campus or a total of \$43.75M.

6. To what extent will right-of-way issues lead to incremental costs not reflected in these estimates? How will right-of-way issues impact the timeline of build out to these institutions?

The numbers in the attached are inclusive of right of way costs. Right of way issues are likely to consume from 10% to 90% of project timelines. In California it is not unusual for right of way and permitting issues to take between one to two years.

7. Should operating expenses be a consideration when calculating cost for connecting anchor tenant institutions to fiber? What operating expenses would be associated with running these networks and how would those vary by type of institution and geography?

Operating expenses do need to be considered. It should be pointed out that the current E-rate rules do not provide for recovery of operating expenses unless services are provided by telecommunications carriers. This restriction should be revisited.

Please see attached for input on operating expenses

8. To what extent will providing fiber to these institutions improve the build out economics in currently un- or under-served areas?

New fiber construction to anchor tenants in un- or under-served areas has the potential of improving the economics of serving non anchor tenants in the same areas. The ability to achieve these economies depends upon the design of the program under which the build out might be funded.

9. To what extent will providing fiber to these institutions directly assist last-mile build-outs in currently un- or under-served areas? For example, will bringing fiber to local schools generally provide shorter loop lengths to surrounding homes or is the location of the communications plant relative to the school and community the primary driver? How will that vary by population density?

Bringing fiber to schools may assist last mile build outs. It is impossible to know if this will vary by population density without doing engineering designs, but given that less densely populated areas are less likely to have an abundance of fiber it can be assumed that such communities would be more likely to benefit.

# Federal Stimulus Funding and the Cost of Connectivity to Anchor Tenants

CENIC  
October, 2009

The Federal broadband stimulus funding has created a flurry of activity surrounding how to provide network connectivity to different groups of network users. Among these are “anchor tenants”, including libraries, schools and colleges and others. During the deliberations on stimulus funding, the question has been posed as to what it would cost to connect, on average, a school or library. The purpose of this note is to attempt to shed light on the difficulty in answering this question and the broad range of costs for connectivity.

First, it is important to recognize that there are both one time and ongoing costs to provide connectivity. Pricing, which is different than cost, may distribute onetime costs over multiple periods (months or years) , effectively reducing onetime costs and increasing ongoing costs by spreading onetime costs over multiple years and/or multiple sites. This note will refer to costs, rather than pricing.

There are various means of providing connectivity to a site (various wireless and wire line approaches). For the purposes of this note the assumption is that a site is being provided access via a wire line approach, the “wire” for all high speed networking being fiber optic cables. Note that these cost elements are common among a privately owned network, say, operated by a municipality or a regional education and research network and a for profit telecommunication company. Major cost elements are as follows:

What	Cost Range	Basis of Cost within Range	Onetime or ongoing
1. Conduit and fiber	\$1,000-\$1,000,000	Distance between site being served and point of connection to outside network; existence of conduit; sites being served by fiber bundle/conduit	Generally onetime but may be leased (ongoing)
2. Conduit and fiber maintenance		\$100-\$500 per mile/yr.	Annual/ongoing

3. Equipment	\$10,000-\$50,000	Distance of fiber; ability to share/serve multiple users from particular equipment components; speed of network	Onetime, but cost will reoccur every 4 to 6 years so can consider an annual cost (onetime cost divided by useful life)
4. Equipment Maint.	\$1500-\$7500		Annual/ongoing
5. Installation	\$10,000-\$150,000	Depends on amount of equipment installed, length of fiber run and network speed	Onetime
6. Network monitoring and support	\$1000-\$10,000	Depends on type of network equipment, amount of equipment, size of network (economies of scale)	Ongoing
7. Colocation/space power (for equipment at non site end of fiber)	\$10,000/year	Varies depending upon availability of colocation/space and power and types/amounts of equipment being installed	Ongoing
8. Traffic over commercial internet	From \$5 to \$50 per megabit per month	Based on usage	Ongoing

Federal stimulus funding is focused on items 1, 3 and 5 in areas which are un- or under-served, that is, loosely speaking in areas where these expenditures have not been made by traditional market forces. As a result, the areas to be reached by stimulus funds are, almost by definition, those with the highest costs. And, depending upon the density of sites being served the onetime costs per site can be quite high. For example, if conduit and fiber are being installed to serve one remote school or library, over mountainous terrain and 100 miles from a major connection point to other networks, the costs of new fiber installation could be \$1,000,000 one time, plus the costs of equipment to create a network on the fiber, perhaps \$50,000.

It is important for policy makers to understand that the cost of installing new infrastructure (items 1, 3 and 5 above) to create networks will vary greatly,

depending on the density of the area to be served, a higher density reducing the cost per entity served; the distance of the area from existing high speed commercial networks; geography and terrain; the availability of conduit or poles for installation of fiber and other similar factors. If the policy goal is to serve un- and under- served areas, care must be taken not to underestimate the onetime cost of serving these areas not already served by market forces. And it is important to recognize the significant ongoing costs as well.