NEO CONNECT

WHY DON'T WE HAVE BETTER BROADBAND?

What's Standing in the Way?

While broadband service is increasingly seen as a utility, advanced telecommunications capability is not being deployed to all Americans in a reasonable and timely fashion.

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The Broadband Gap

Today it is so widely understood that broadband is a necessity, even the Federal Communications Commission is classifying it as a utility – and gaining support from appellate courts when carriers push against the classification.[1] Advanced broadband service is a necessity to live and thrive in today's economy much like water and electricity. Unlike water and electricity; however, broadband is a technology that has numerous levels of service. While water and electric utilities across the country provide basically the same service to all homes, the same cannot be said for broadband.

In the last six years, there have been significant improvements in broadband infrastructure investment in the United States. Broadband investment has been sparked by competition. In order to best understand this, a brief history in broadband investment is needed. Prior to 2010, Verizon was the only incumbent service provider that implemented Fiber to the Home technology with rollout of its FIOS product. In 2010, approximately 2% of U.S. households had a fiber optic connection. Meanwhile, in Japan, Korea, and Sweden, over 80% of their populations had a fiber connection.

Large, incumbent phone and cable companies had little incentive to further invest in their networks. Most cities and towns had either a near monopoly or a friendly duopoly in which the two incumbent providers—the cable TV and major telecommunications company—had limited competitive pressure to improve their network infrastructures.

Although the National Broadband Plan that was implemented by the U.S. had adequate goals and benchmarks to further broadband advancement, it fell short in terms of actual implementation plans to make these goals a reality. Additionally, state and local governments had done little to encourage further investments. On the municipal-level, many city ordinances and policies discourage further investment by any new providers with cumbersome building and permitting regulations, raising the capital costs and time to build out fiber optic infrastructure.

This changed in 2012 when Google decided to invest in Gigabit infrastructure that included an all-fiber connection to every home and business. While gigabit speeds are argued as not needed today, the goal of achieving gigabit speeds is an aspirational one, looking to fill bandwidth needs for the foreseeable future. Google issued a Request for Proposal for the "Think Big with a Gig" program to host gigabit test-beds and have Google build within their city, and over one thousand communities across the country submitted applications.[2] Google selected the bi-state Kansas City metropolitan region. Google's network build-out and their offering of residential Gigabit of service for $70 per month put Kansas City in the top five of the world's most connected cities with the world's most inexpensive bandwidth.

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[1] http://www.nytimes.com/2016/06/15/technology/net-neutrality-fcc-appeals-court-ruling.html?_r=2

[2] *Topeka 'renames' itself 'Google, Kansas,'* CNN, March 2010, http://www.cnn.com/2010/TECH/03/02/google.kansas.topeka

Competition Drives Broadband Investment.

Since Google's rollout of gigabit services in Kansas City, it made plans to build Fiber to the Home in Austin and then subsequently purchased an existing system in Provo, Utah. Google then announced plans to build FTTH in 34 municipalities across the country upon cooperation and attainment of a checklist put out by Google. Perhaps one of the biggest impacts of Google jumping into the broadband infrastructure market was the impact it had on other providers investing in infrastructure. After Google's entrance into the Internet infrastructure industry, other companies such as Time Warner Cable, SuddenLink, Grande Communications, Charter and Cox Communications made announcements to also build out Gigabit-cable infrastructure. Aside from this, in large markets where incumbent providers are trying to out-build Google and their competitors, broadband speeds have increased dramatically.

This too has inspired municipalities and electric cooperatives to also build fiber optic infrastructure, knowing that a "wait for Google" approach is not shortly forthcoming. State governments have put together a number of initiatives to help spur more broadband development. This gap between need for more broadband capacity and the ability to fill this gap across the entire U.S. has not yet been filled.

While Investment Has Occurred, Progress Still Needs to be Made

While Google has helped disrupt the status quo in specific communities, in general the U.S. has yet a long way to go towards addressing bandwidth needs. According to an article recently published in December 2015 on Huffington Post which cites many sources measuring the U.S.'s progress in broadband advancement, "America's wireline or wireless broadband speeds are not even in the Top 20 in the world, much less are reasonably priced."[3] According to the article, the U.S. is ranked 55th in the world in wired and wireless broadband.

Rural Markets Have the Least Capacity Available

While there are federal funding programs to build broadband services to rural areas, the rural parts of the country still have the least capacity available. Using the FCC's definition of broadband of 25 Mbps in download speeds and 3 Mbps of upload speeds, the FCC's 2016 report on broadband finds that almost 34 million Americans – 10 percent of the population – lack access to advanced broadband. More significantly, 39% of rural Americans do not have broadband access that meets this new definition. In contrast, only 4% of urban Americans lack access to 25 Mbps/3 Mbps broadband service. This is often the result of carriers lacking a "business case" to make back their investment when building in lower populated areas.

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[3] *America's Broadband Embarrassment*, Huffington Post, December 2015, http://www.huffingtonpost.com/bruce-kushnick/americas-broadband-embarr_b_8736488.html?mc_cid=b49548b233&mc_eid=1479b8f1cc

Rural areas lack sufficient broadband to meet the minimum standard definition of broadband. But larger cities and metropolitan areas also need investment in broadband infrastructure to compete in the global economy. The gold standard for broadband is Gigabit symmetrical bandwidth (1,000 Mbps in both download and upload speeds). Cities in urban areas need to find ways to facilitate the availability of this type of broadband availability.

What are the Primary Barriers to Better Broadband and How Can these Barriers Be Mitigated?

As it is understood that having access to abundant, affordable broadband is a necessity, then why is it that we don't have better broadband? The following provides insight into the difficulties and obstacles for better broadband and what steps can be taken to remove and mitigate these barriers.

A duopoly or monopoly stifles investment. As discussed earlier in this document, one of the primary barriers to better broadband exists when the incumbent providers have little incentive to upgrade their networks. As most cities and towns have had a comfortable duopoly or in some cases, a monopoly for Internet service delivery, the incumbent cable and telecommunications carriers have had little competitive pressure to build more fiber, a capital-intensive process.

The entrance of a competitor can disrupt this status quo. Communities that have a number of choices for Internet service, especially if these choices provide a significant transformation of service delivery (i.e. leapfrogging the incumbent provider's 5 Mbps, or 8 Mbps to 100 Mbps or 1 Gbps), the incumbent providers will be required to upgrade their infrastructure or provide comparable services in order to maintain their market share.

In some communities, a competitor has come into the market and has built out a wireless solution as building a wireless infrastructure is not as capital-intensive as building out a fiber optic infrastructure. However, wireless technology often does not disrupt the status quo because it cannot out-perform the existing service offerings available.

Capital costs are high to build fiber optic networks. Building a Gigabit-enabled network is capital intensive. Current technologies that support this type of bandwidth availability require fiber to be built to every home or business if an advanced wireless network is used, fiber must be built to most of the wireless access points. In either case, the physical placement of fiber optic cable is often too capital-rich for a small competitive provider. While some smaller carriers are able to provide fiber to an entire community, this typically needs to be a highly populated area to pay off the investment. A model to support the high costs of building fiber is harder to justify in sparsely populated, rural areas, but it is also difficult in urban areas of the country too.

In rural areas, the capital costs required to build out fiber are higher, as rural areas are remote with the population geographically dispersed. Access to Internet "supply" – locations where there is an Internet hub – is often located in larger cities or population centers. Options for

accessing Internet hubs, which is typically described as Internet backhaul or transport costs, are to either build fiber to this Internet hub location, to build a point-to-point digital microwave link, or to lease existing facilities. In any of these options, the capital costs are high and/or the monthly access charges are high.

These high monthly backhaul charges or capital costs to connect to Internet hubs are difficult to finance as rural areas do not have the population to support an adequate return on investment for any providers to upgrade their networks. This leaves rural areas with few options for improving broadband services. The Stimulus Program provided $7.2 Billion to mostly improve backhaul or transport costs by providing funding for middle-mile networks, but there still is an overwhelming number of communities that do not have options for inexpensive costs to access Internet "supply."

Metropolitan areas typically have abundant access to Internet "supply" and have a number of providers to choose from. The challenge in urban areas is simply in the cost to build fiber infrastructure to every home and business.

The business model to build in a rural market is challenging. Further complicating the high capital costs to build infrastructure in or to rural markets, is the challenge of making a business model work in a rural market. Population density is lacking in rural areas and the number of potential business and residential customers is relatively small, creating an undersized revenue opportunity compared to a larger market. Additionally, the challenge of finding people, technicians and a management team to operate and manage the system in rural and remote areas is sometimes difficult. The return on investment is typically lower in rural areas.

Metropolitan areas can usually justify the business case with higher density and population numbers. The challenge for urban municipalities is in managing debt, financial and potentially political risk in building fiber optic infrastructure.

What Can be Done?

Lift or Opt-Out of Regulatory Restrictions. Given all that a community has to gain, it would seem a reasonable assumption that each would take matters into their own hands and build their own next-century broadband network. Regulatory restrictions can stand in the way of local governments in many states, including Colorado where Senate Bill 152 prohibits local government from building telecommunications infrastructure except to government agencies and quasi-government agencies (schools, hospital, universities). The law can be overturned with a majority vote in a public election to opt-out of the bill.

Overcoming Challenges Through Collaboration
Leveraging what your community already has in place in terms of community assets and potential collaboration and partnerships is often a great start towards reducing costs for your network.

For instance, aggregating demand among communities and anchor institutions (schools, hospitals, libraries, etc.) creates a cost-sharing model for access to the Internet hub. Or existing connections can be used to eliminate the high cost of connecting to the hub but using fiber from already existing networks or connectivity already built. One such example where you may be able to use existing assets is using fiber previously built by electric utilities.

A close examination of your community assets can also turn up existing land, lease structures, tower locations, conduit and unused (dark) fiber that can all be used to help reduce the costs of building a new fiber network. Breaking down the silos that exist between entities – schools, other government agencies, hospitals, and the electric utilities, can facilitate a collaborative and more effective ability to improve broadband services within a community.

Finally, more and more communities are developing innovative public-private partnerships. Many models allow cost sharing to help facilitate a business model that helps investment make sense for the private sector.

Overcoming Challenges Using Programs and Policies

Beyond Colorado's Senate Bill 152, many city/county ordinances and policies create cumbersome building and permitting regulations that significantly increase time and costs required to build broadband infrastructure. Beyond making it hard on your community to build should you have to, these hurdles discourage private investment from ever happening.

Examine the programs, policies and broadband-friendly ordinances can be put in place to try to mitigate the high-costs of building fiber networks. With the right changes many local governments can promote, rather than hinder, private investment.

A majority of the capital costs (60-80%) for building fiber are in the actual opening of a trench or the labor to place conduit in an existing right of way or road. Forward-thinking, broadband-friendly ordinances such as a "dig once" policy can help mitigate this cost by allowing multiple providers to place conduit within an open trench when other utility work is being done. Other policies such as streamlined permitting, and joint-build and joint-trench agreements can also promote more broadband deployment.

Conclusion

There's no question that robust, high speed broadband has not reached "utility" status for most communities in Colorado. The needs of today, let alone tomorrow, are not being met because private carriers are not able to justify investment in next-century broadband.

Municipalities can determine the best model for investment, whether it is building infrastructure and offering Internet services themselves, or partnering with the private sector to share in the costs or incenting more private investment through collaboration and policies. Regardless of the model or approach, municipalities that have a vested interest in their economic vitality can greatly impact the availability of abundant broadband service by participating in the process.