SOUTHWEST COLORADO COUNCIL OF GOVERNMENTS

Broadband White Paper

Use, Impact, and Policy Implications

In cooperation with Roger Zalneraitis, Executive Director, La Plata County Economic Development Alliance

When people think of the internet, increasingly they think of using the internet to instantly send and receive large volumes of data, such as watching movies on Netflix or Hulu. Although broadband technology is technically a way of transmitting information over the internet, in popular terminology, it is synonymous with high speed internet access[1]. Broadband is the way people get high speed internet.

In a location where broadband is accessible and affordable, families can talk to relatives via Skype, students can do research and take classes/earn degrees, doctors can transmit health records to work with their patients anywhere in the world, and businesses can work in the "cloud" and take payments online to reduce overhead. Almost of these actions would be hampered or even impossible without broadband. Broadband is a key enabler of a better quality of life for people and better opportunities for businesses to start, grow, and flourish.

This this paper will 1) provide a better understanding of what broadband is, 2) show how broadband provides economic and educational impact, 3) look at geography and broadband access, and 4) develop policy recommendations for broadband in Colorado.

Demand and Investment in Broadband

Demand

There is a wide range of opinions regarding what speed constitutes high speed internet access. The FCC routinely evaluates how many households have access to internet speeds of at least 200 kilobytes per second (kpbs) or higher. Other studies talk about internet speeds 3 megabytes per second (mbps), 4

[1] For the technical definition, see http://www.webopedia.com/TERM/B/broadband.html . For the popular definition, see http://www.pcmag.com/encyclopedia/term/38932/broadband

mbps, or more as high speed access. Some studies only define broadband as the type of access and ignore speeds[2].

The best way to see what constitutes broadband is to look at what different speeds allow people to do, and what different types of households and facilities need to work with streaming information. The FCC provides a good overview of what different speeds allow households to do (next page).

FCC Summary of Use and Speed Requirements[3]

	Light Use (Basic functions only: email, web surfing, basic streaming video)	**Moderate Use** (Basic functions plus *one* high-demand application: streaming High Definition (HD), video conferencing, OR online gaming)	**High Use** (Basic functions plus *more than one* high demand application running at the same time)
1 user on 1 device (e.g., laptop, tablet, or game console)	Basic	Basic	Medium
2 users or devices at a time	Basic	Basic	Medium/Advanced
3 users or devices at a time	Basic	Basic/Medium	Advanced
4 users or devices at a time	Basic/Medium	Medium	Advanced

Basic Service = 1 to 2 Mbps*
Medium Service = 6 to 15 Mbps
Advanced Service = More than 15 Mbps

Traditional uses of the internet such as email and basic web surfing require little more than 1 to 2 mbps, even with multiple users. However, larger users (such as families with children, college students sharing an apartment, and businesses) need higher speeds. Another consideration is that the things that people use the internet are changing quickly. Streaming video, video conferencing, the ability to work remotely, accessing large volumes of data, voice over internet protocol (VOIP), and high resolution file transfers are prerequisites for many internet users in this day and age. For locations with three or more internet users, 6 mbps is a minimum definition for high speed internet.

[2] See, for example: http://www.ntia.doc.gov/files/ntia/publications/ntia_internet_use_report_february_2011.pdf
[3] https://www.fcc.gov/guides/household-broadband-guide

Other reports by the FCC show that loading speeds for websites are maximized at 10 mbps[4]. Households are continuing to migrate to higher speed internet access. This migration to higher speeds tends to slow down at 10 mbps[5]. Finally, the National Telecommunication and Information Administration (NTIA) estimates that businesses generally need even higher broadband speeds, as they typically have more users and larger data demand[6]. All of this suggests that a good threshold for high speed internet access is no less than 6 mbps for households and 25 mbps for businesses, and higher for education, depending on the size of the institution.

Investment

While there is clearly demand for higher and higher broadband speeds, supply is challenged by the economics of investment. Broadband investment is most likely to yield profits where the highest density of customers exists. This allows organizations to spread the investment cost across a large number of users and generate a return more quickly. In places with fewer potential customers, a positive return on investment is much more difficult to achieve.

The International Telecommunications Union (ITU) estimates that the price of internet access fell by 82% globally between 2008 and 2012[7]. However, this means declining revenues and rapid obsolescence of investments for providers. This makes it challenging for a private firm to recoup its investment. Thus while the need for higher speed internet is increasing, areas where inadequate bandwidth run the risk of falling further behind as high capital costs and rapidly falling prices make successful investments even more difficult.

Broadband and Economic Growth

Does broadband help increase economic growth and employment? This question has become a hot research topic in recent years. The general consensus is that there is a positive impact to economic growth and employment.

The most comprehensive review of the research on the economic impact of broadband was conducted by the ITU in 2012[8]. They reviewed almost all the research conducted to date, and found that broadband does indeed have a positive impact on economic growth. The study found that the economic benefits of broadband are most clear when:

- Areas had *no access* to broadband prior to its installation;
- *Adoption*, or the use of broadband, is high. Access to broadband is necessary but not sufficient for economic growth;
- *Scaling* occurs. That is, the higher the percentage of broadband adopters in a geography, the greater the economic impact;

[4] http://www.fcc.gov/measuring-broadband-america/2013/February
[5] Ibid, chart 2.
[6] http://www.ntia.doc.gov/files/ntia/publications/jobs_broadband_report_nov2013_final.pdf
[7] http://www.un.org/apps/news/story.asp?NewsID=44242&Cr=broadband&Cr1=#.Uv2QUbTwt3U
[8] http://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf

- Industries that have *high transaction or labor costs*—such as financial services and tourism—adopt broadband; and
- There are improvements in *operations* at existing companies, and new companies emerge tied to new technology opportunities.

In practice, these findings mean lower costs for businesses and consumers, new revenue opportunities, and improvements to quality of life. Broadband can help companies store their data offsite, preventing system crashes from costing tens of thousands of dollars in lost time and information. Broadband connectivity allows retailers to compete online, increasing their sales[9] while enabling sole proprietors to work remotely, which can boost the economy in the area where they live[10]. Broadband also allows employees to telecommute, reducing the costs that businesses have for physical space, as well as wear and tear on public infrastructure, and pollution from commuting.

Two examples of how broadband affects a company's growth and economic development can be found in Southwest Colorado. The first firm, a multinational engineering and manufacturing firm, adopted broadband two years ago. As a result, they migrated their data to the cloud; integrated their computer systems; expanded remote monitoring, conferencing, and training; switched phone service to Voice-Over-Internet (VOIP), established electronic transfers for payment processing; and adopted e-commerce for vendors. The company is now saving well over $150,000 per year in operation costs. A second company was recently formed to create a new technology specific for high speed internet. This firm now employs 700 people in two locations in Colorado. These jobs would not exist without adequate broadband infrastructure.

Broadband and Education

With the proliferation of access to the internet, online courses and degrees have become widespread. These classes and degree programs range from high school classes, advanced placement classes, GED programs all the way to PhDs. Local school districts have embraced broadband as another tool for K-12 education. Several of the smaller districts in the SW Colorado region have started using technology on a daily basis by creating one to one classrooms (one student per device – iPads or laptops). Students in these rural districts are able to access additional information and learning opportunities, as well as becoming prepared for the use of technology in the workforce and further educational opportunities.

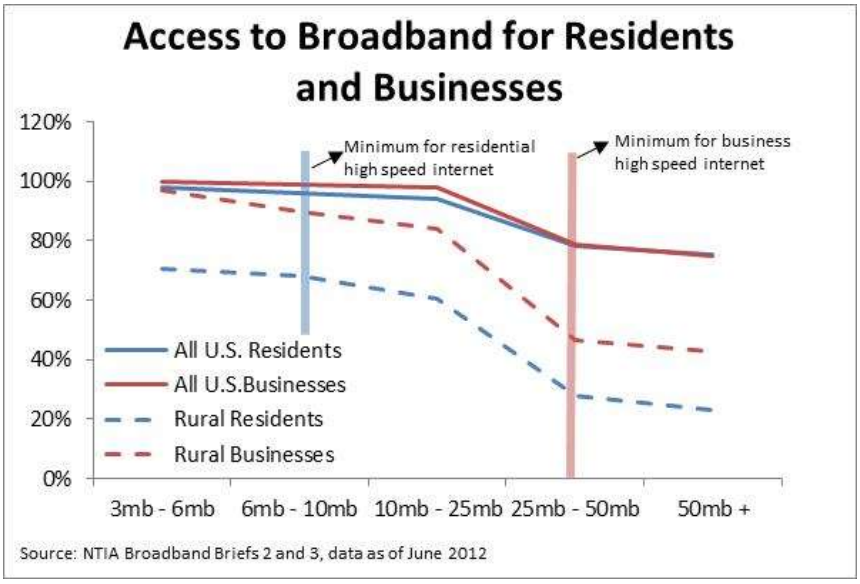
Geography and Broadband

The NTIA has conducted several studies and found that residential and business broadband access is generally good. As of June 2012, almost 98% of all residents and 99% of all U.S. businesses had access to

[9] http://www.connectednation.org/sites/default/files/cn_biz_whitepaper2012_final.pdf provides a complete list of benefits of high speed internet for businesses.

[10] A recent analysis by the Western Colorado Economic Alliance found that no fewer than 55 sole proprietors have grown businesses that now employ over 2,000 people on the Western Slope, contributing to the economic diversification of the region. Much of this job growth would not have been possible without broadband.

3 mpbs download speed or greater[11]. Roughly 75% of all residents and businesses had access to speeds of 50 mbps or more. However, there are key disparities for rural areas. The chart below (next page) shows, first, that rural residents and businesses have lower access to broadband than the nation overall. For example, only 68% of rural residents have access to download speeds of 6 mbps or greater, compared to 96% of the overall population. Second, as we noted earlier, businesses generally need higher speed broadband than homes. Whereas 96% of residents have access to at least 6 mbps download speeds or more, only 79% of businesses have access to 25 mbps or more, and less than half of rural businesses have access to 25 mbps download speeds or more.



Residential areas that lack broadband are less attractive both to families, the increasing number of "lone eagles" who either work for themselves or work remotely, and retaining citizens who want to continue or further education. Areas that lack broadband either because they are in rural areas or in a "donut hole" in urban areas where the cost to extend service is too expensive, will find it difficult or even impossible to grow or retain companies in innovative fields such as technology or health care, while also affording fewer opportunities for other firms to sell products online or generate efficiencies and costs savings through technology. While these areas typically have less access to traditional educational opportunities, the lack of broadband compounds the lack of access.

Adoption of broadband is also important. Recent studies by NTIA found that 72% of Colorado households had adopted broadband by 2010[12]. The NTIA study also found that certain households were less likely to use broadband than others. Among those household types were rural households, low income households, and the elderly. One thing to note is that the NTIA study took a very wide definition of broadband, including services that could be less than 1 mbps in speed. A more recent survey by the FCC looked at broadband by speed found only about 64% of households in Colorado had adopted speeds of 3

[11] http://www.ntia.doc.gov/files/ntia/publications/usbb_avail_report_05102013.pdf and http://www.ntia.doc.gov/files/ntia/publications/jobs_broadband_report_nov2013_final.pdf
[12] http://www.ntia.doc.gov/files/ntia/publications/ntia_internet_use_report_february_2011.pdf

mbps or greater by the end of 2012[13]. While the adoption rate is likely higher for businesses, it is also almost certainly lower for them in rural areas.

Policy Recommendations

Broadband is a utility for businesses, education, and residential customers, no different than water, sewer, telephone service, electricity, and roads. Without widespread broadband access and adoption, the Colorado economy and residents will not achieve their full potential. Areas without adequate internet access, rural or urban, have fewer opportunities for businesses to start and grow, and are less desirable places to live for employees, families, and sole proprietors. The expansion of broadband access is key for furthering Colorado's economic growth and educational attainment.

Sound broadband policy should:

- **Set a goal for 100% broadband access, 90% adoption, in five years for all residents and businesses of Colorado**. This allows the state to measure its progress and tailor its solutions as needed.
- **Define broadband access to be at least 10 mbps or more**. This appears to be a preferred speed for many internet users. The definition should be flexible to account for future need that will very likely be higher.
- **Be technology neutral**. Fiber broadband tends to perform the best among technologies. However, this can change as other technologies continue to evolve. Further, fiber access is not possible for all users. Policy should be flexible as long as 10 mbps is being achieved.
- **Minimize costs**. Costly access can inhibit adoption. Incentives should be targeted to:
    - Help low income families afford broadband,
    - Connect or increase speeds at K-12 educational facilities,
    - Reduce the costs of infrastructure in areas where there is currently no or limited access,
    - Encourage open access solutions when supporting new infrastructure. This increases options for residents and businesses, lowering their costs.

[13] http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/ias1212_tables.docx, p 35