Bad Broadband Equals Low Population Growth

An original **Broadband Communities** study shows a startling, 10-fold difference in population growth between broadband haves and have-nots.

By Steven S. Ross / *Broadband Communities*

Good broadband is even more closely related to economic opportunity than has been realized. An exclusive **Broadband Communities** analysis of census data and National Broadband Map (NBM) data for all 3,144 counties in the 50 states and District of Columbia reveals that counties in the bottom half of their state rankings for access to 25 Mbps download speeds had a population growth of only 0.27 percent from 2010 through the end of 2013. The top half enjoyed growth of 2.79 percent – more than 10 times greater.

In actual numbers, counties in the bottom half of their state rankings added just 134,390 people, and those in the top half added more than 7.2 million.

The differences are even more stark when the top 10 percent of counties in each state is compared with the bottom 10 percent. The counties ranked in the lowest 10 percent for broadband access *lost* 0.55 percent of their population on average. The top 10 percent gained 3.18 percent. The single top-ranked counties in each state grew even faster – 3.61 percent.

Again, in actual numbers, the top county in each of the 50 states added more than 1.1 million to their populations in the aggregate – a quarter of the total population gain experienced by the top 10 percent.

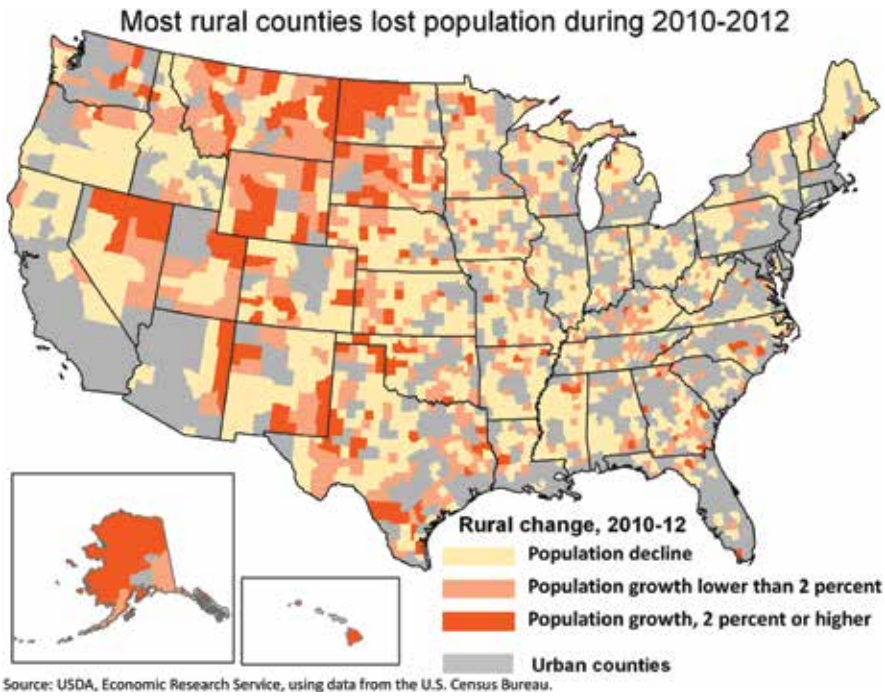
A recent Commerce Department study highlights the relative lack of broadband in rural areas compared with urban areas, and new census data shows that, between 2010 and 2012, for the first time in U.S. history, most rural counties lost population. The **Broadband Communities** study confirms a strong association between these two phenomena. The methodology used in this study overcomes many of the shortcomings of studies released by the Commerce Department.

Counties that lag other counties in their states in access to good broadband are actually losing population; counties with the best broadband in their states are growing quickly.

COUNTY RANK WITHIN STATE FOR 25 MBPS COVERAGE	2010 POPULATION	2013 POPULATION	POPULATION CHANGE	PERCENT CHANGE
Bottom 10%	5,420,347	5,390,628	-29,776	-0.55%
Bottom half	49,586,078	49,720,525	134,390	0.27%
Bottom county	1,318,114	1,322,720	4,549	0.35%
Top half	258,559,871	265,761,865	7,201,994	2.79%
Top 10%	131,229,210	135,396,793	4,167,583	3.18%
Top county	31,225,768	32,351,828	1,126,060	3.61%

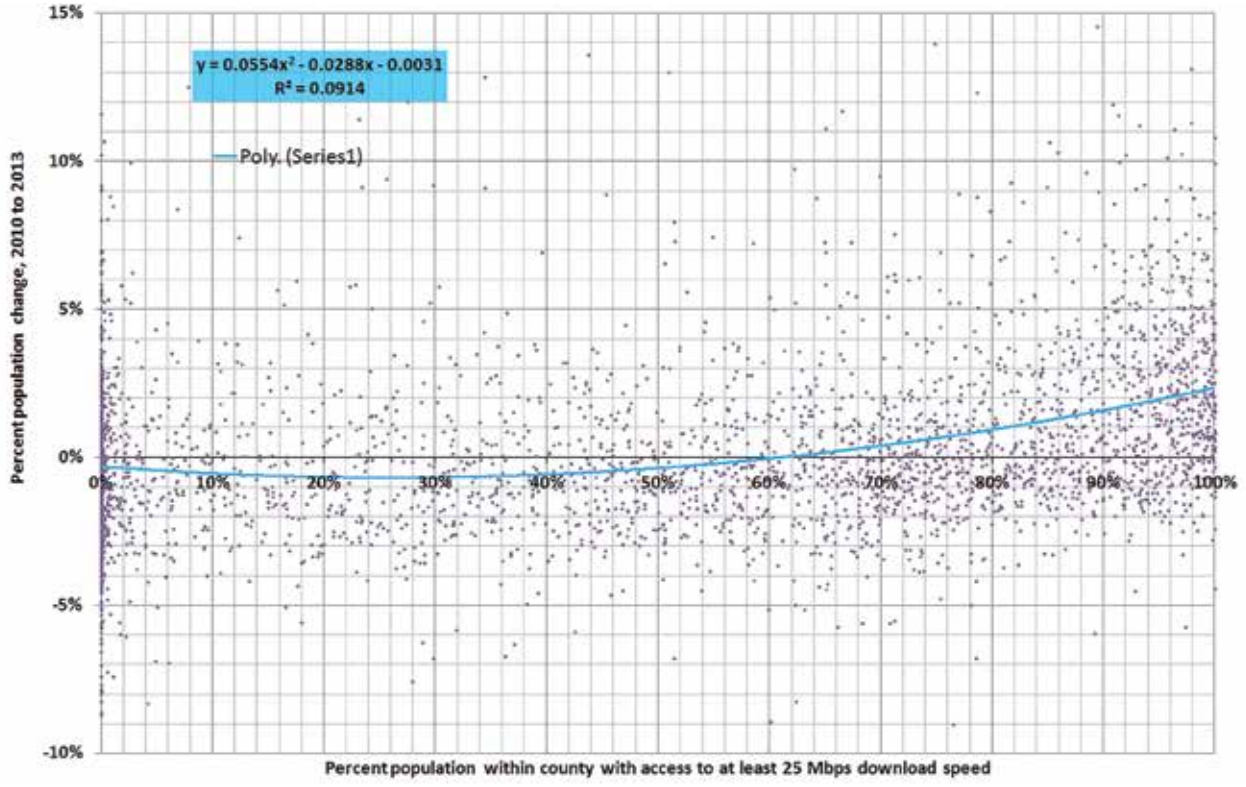
The 1,500-plus counties in the top half of their states in terms of access to at least 25 Mbps broadband enjoyed 10 times the percentage population growth of the bottom half. The bottom 10 percent in each state, in aggregate, actually lost population.

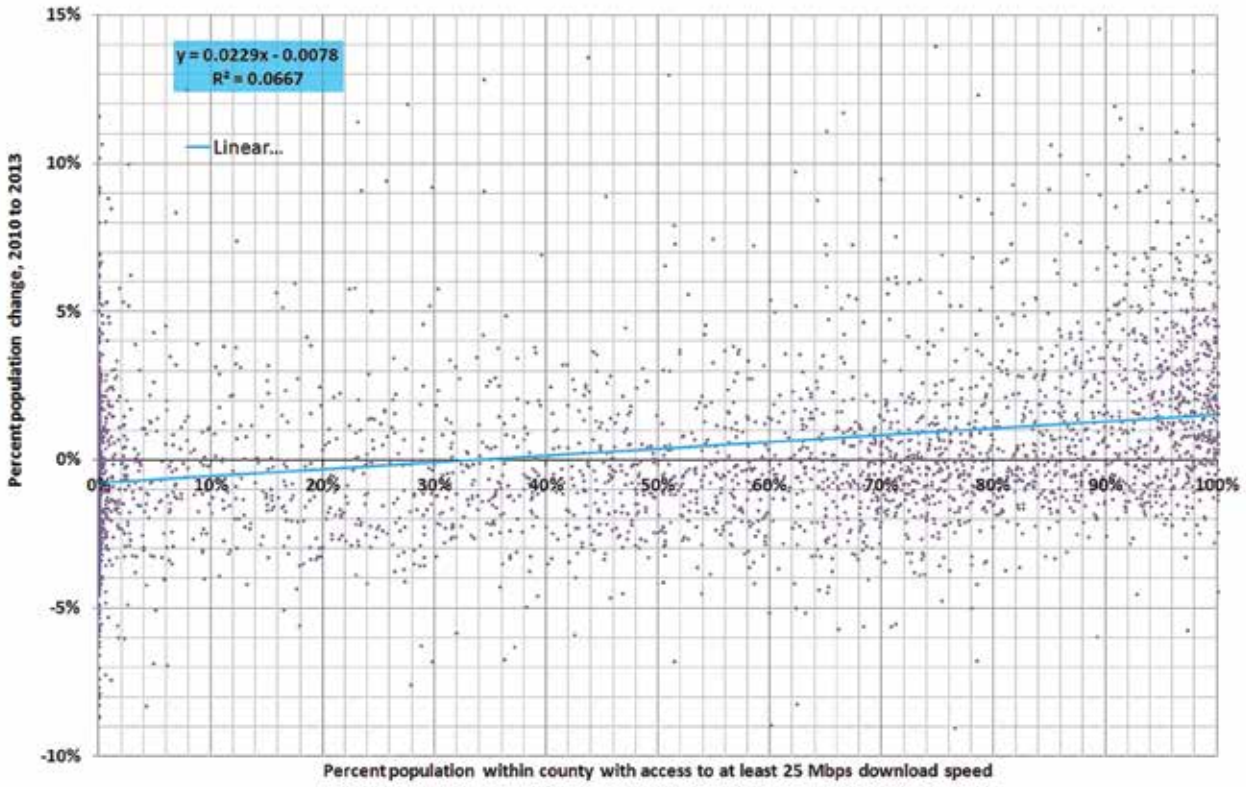
- This study defines broadband as 25 Mbps, which FCC Chairman Tom Wheeler recently said was "fast becoming 'table stakes' in 21st-century communications," rather than as the 3 Mbps speed that the NBM rural-urban comparison uses. Access to 25 Mbps service is a realistic indicator that a household or business can use most available broadband applications.
- Using countywide data sidesteps the issue of "if it is available anywhere in a ZIP code or census block, everyone in the area is assumed to have access" because each county contains multiple census blocks and ZIPs. The percentage of households with access is rated across multiple ZIPs, which allows a meaningful ranking system within each state.
- Aggregating by county is preferable to aggregating by state, as many NBM studies do, because almost all states have wide variations among counties.
- This study does not require identification of counties as "urban" or "rural," categories that are notoriously difficult to define at the county level. Exurban counties often include some areas that are functionally urban and others that are functionally rural.
- By using population change as the key economic metric, this study can access more current and more accurate base data than studies that rely on employment change. Population change both drives and reflects changes in employment and income.
- This study extends the population data beyond 2012 and lays the groundwork for more refined analyses that include the number of premises and road miles for each county; the number and size of multiple-dwelling-unit buildings, business premises and households (to determine the percentage of premises actually occupied); and population age profiles.
- The study uses percentile rather than absolute ranking of counties because states range in number of counties from three in Delaware to 254 in Texas. The District of Columbia has just one "county" by census rules. Obviously, the eighth-ranked county in Texas would differ competitively from the eighth-ranked county in Connecticut (which has only eight counties).



Source: USDA, Economic Research Service, using data from the U.S. Census Bureau.

Rural counties suffered population decline in every region. This is the first time in U.S. history that population declined in a majority of rural counties.





There is a clear relationship between percentage population gain or loss and the percentage of the population in a given county with access to at least 25 Mbps download speed. Nevertheless, the availability of broadband at that speed accounts for only about 10 percent of the variance in population change. In these charts, each of the 3,144 counties in the United States is represented by a dot, no matter what the county's population actually is. Counties on the left side of the chart (low broadband availability) tend to be much, much smaller than counties on the right. Regression error is very small; there is almost no Working-Hotelling effect, and n is very large. Source: **Broadband Communities**, from census data April 2010–December 2013, and National Broadband Map, data mainly from December 2013.

WHY DO GROWTH RATES DIFFER?

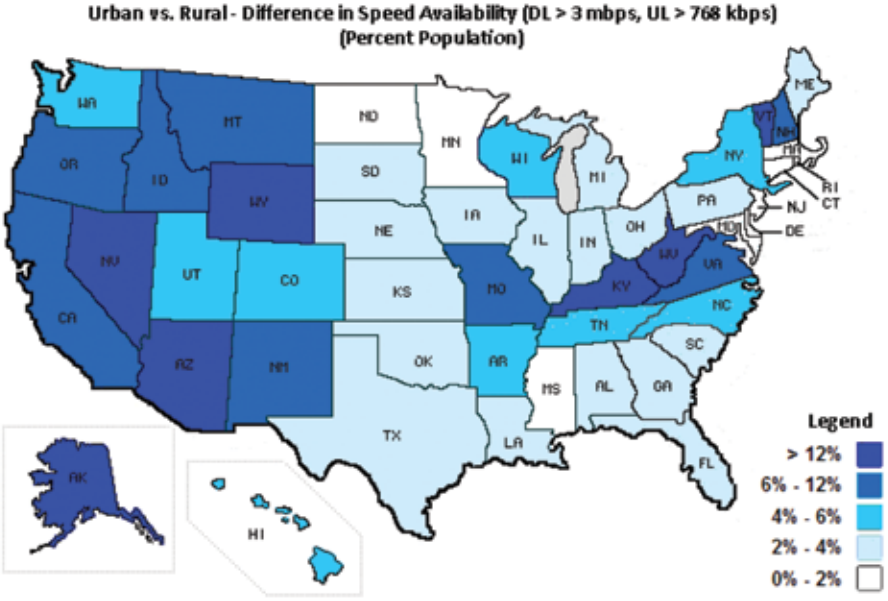
The reasons for county growth disparities go far beyond access to broadband, of course. In fact, many of the most sparsely populated counties added population after 2010 even though the majority of counties that the census defines as "rural" lost population. When population is very low, construction of a single new business premises or small subdivision can add several percent to population in a single year.

The scatterplots (which, in the interest of clarity, omit a few counties with post-2010 population growth greater than 15 percent or less than -10 percent) show the wide variations in percentage growth at any level of 25 Mbps (and higher) access speeds. Still, counties with little or no broadband access at this level tend to have much lower populations, and those with near-zero broadband access tend to have the lowest populations of all.

Two possible relationships between broadband access and population loss or gain were tested – a linear (straight-line) relationship and a second-order polynomial (curved-line) relationship. A polynomial relationship suggests that broadband's effect on population change is stronger when broadband is more available. The polynomial relationship turned out to be a slightly better fit (R^2= 0.09 versus 0.07) and does not cross into positive population growth before 60 percent access to at least 25 Mbps. The linear regression goes positive before 40 percent. This suggests that access to good broadband could account for nearly 10 percent of the population changes seen – quite a lot for a single variable.

But is it lack of broadband that causes the population loss? Or does population loss, with its bad prospects for turning a profit on broadband, limit broadband availability? Last year, for example, CenturyLink listed metropolitan population growth as a criterion in its choice of locations for gigabit deployments. The data are not adequate to definitively answer this question, and conversations with county and state officials suggest that, in some cases, population loss was already ongoing, and in other cases, lack of broadband seems to have caused population loss.

The shape of the "scatter" in the scatterplots suggests that for at least half the counties, population loss was an effect of poor broadband, not the cause. However, answering the cause-and-effect question is not a purely statistical exercise. To arrive at a strong conclusion in any one county requires considering many variables – the age and education profile of the population, incomes from government transfer payments and pensions as well as from current economic activity, job creation and so forth.



This National Broadband Map graphic shows the difference in access between rural and urban areas in each state for low access speeds (at least 3 Mbps down, 768 Kbps up). The deep blue states have a disparity of greater than 12 percent, and the very lightest blue states have a disparity of only 2 to 4 percent at these low "broadband" speeds. Source: National Broadband Map.

The stimulus program (which reduced deployment and operating costs by cutting backhaul prices), emerging technologies for cutting deployment costs, and increasing revenue potential also put their thumbs on the scale.

By using the state rankings, this study essentially compared counties with nearby counties that have better or worse access. This is an especially good technique when population migrations are considered. The easiest migrations are short – to the next county rather than to the next state or the opposite coast.

Often, of course, the nearest county with good prospects is in a nearby state. The next iteration of this study will check that effect as well. See us at the **Broadband Communities** Summit in Austin next April for an update! ❖

Which comes first, population loss or inadequate broadband? It seems likely that population loss comes first in some instances and poor broadband in others.

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