Attached are my comments in response to the Notice by the Rural Utilities Service and the National Telecommunications and Information Administration on 04/29/2015.

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Thoughts on rural broadband

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In response to Question 8 of the 04/29/2015 Notice and Request for Comments in the Federal Register

Overview

As the Internet becomes more pervasive, reaching households and communities all over the world, it changes from an interesting form of entertainment to a necessity. The Internet has become an economic necessity; businesses everywhere, and of all sizes, now rely on the Internet for their continuing existence and growth. In the United States at least 60% of the workforce holds what is known as information or knowledge jobs. Today almost all of these jobs depend in some way on the smooth functioning of the Internet or other types of broadband telecommunications networks. Increasingly, along with the growing complexity of business operations, the demand for broadband access grows as well. This is true for both urban and rural areas of the country.

The indirect effects — the externalities — of the Internet are also important. For example, the supposedly unrelated areas of urban traffic congestion, environmental pollution, and climate change are affected by the use of broadband networking. Networking can be a means of reducing traffic congestion, air pollution and the rate of climate change. My research, as well as that of others, has shown that telecommuting definitely decreases overall use of automobile transportation and its associated energy and pollution impacts, thereby producing the desired environmental change results. Furthermore, long-distance teleworking can produce similar impacts through reduced use of air travel. The economic effect is clearly important: teleworkers are demonstrably more productive than their non-teleworking colleagues. In short, the more that people telework the more they aid the environment and the economy.

The greatest of telework's impacts in the urban environment is produced by telecommuting: the use of network technology to eliminate some or all of the daily commute from home to and from the workplace by interconnecting all the coworkers, wherever they are. Sending the work to the worker instead of transporting the worker to work.

In the rural and global environments the impact of telework is different. High-quality telecommunications networks can provide access to jobs in locations anywhere around the globe, thereby increasing the economic vitality both of individuals and rural communities. Telework helps to level the playing field regarding access to jobs. Telework allows people to find work with employers who are completely out of daily commuting range. Telework helps to reverse the situation where young people leave

rural communities in order to find work in the "big city". By keeping them at home telework brightens the future of the communities they would otherwise leave.

Thus broadband telecommunications can serve as an important tool for increasing the economic vitality of the entire country, not just that of certain areas. So just how much "broadband" is necessary for all these wonders to occur?

Broadband and telework

The FCC's definition of broadband is 25 Mbps for download speeds and 3 Mbps for upload speeds. It is possible to telework successfully under the less-than-FCC-standard conditions we have at JALA. However, the bandwidth available to us now is the bare minimum for such work (see the note below). It allows us to videoconference to other countries (as long as we don't move too fast) and perform other tasks which otherwise would need to occur in a setting requiring the physical collocation of all participants.

Twenty years ago much of this would not have been possible. I know because I tried it 20 years ago. But with contemporary technology it is quite possible for many people to telework, both successfully and frequently. This is especially true *if* they have broadband access to the Internet as defined by the FCC — and if their organization operates with a 21st century management style.

Forty years ago telework was primarily limited to telework centers and satellite offices, as they were known then. Available telecommunications technology in that era was simply inadequate — and too expensive — to support even simple data entry tasks for home-based telecommuters. Now, however, at least 40% of the American workforce could be teleworking at least part-time from their homes – provided that they had access to broadband technology as defined by the FCC.

The consequences of that access would be significant in terms of improved productivity, reduced traffic congestion, diminished air pollution, reduced consumption of fossil fuels and generally increased energy savings. Of course, widespread access of broadband communications is not the only barrier to such a goal but such access would greatly diminish the effectiveness of the other barriers - such as the dominant one: resistance to change on the part of management.

Technology is moving relentlessly from fixed lines to wireless transmission for telecommunications. Most forecasts look for relatively slow growth in landline communications as contrasted to double-digit growth in both the numbers of smartphones in use and their monthly data consumption. One of the important features of this turn to mobile over fixed line transmission is that mobile makes it much easier and less costly to provide rural areas with broadband access.
One example of this is that of some friends who live and operate a small business in north-central Arizona off the grid. Their home/office is powered entirely by solar panels, batteries and, occasionally, a diesel generator. Their water is trucked in from the nearest, tourist attraction town. Their access to the Internet is by satellite or smart

phone. The only hardship they claim is the often-glacial data rate from the satellite: "on a weekend it could take a minute [or more] to download an email . . . and your computer just stops loading anything with photos". Expanded broadband wireless outreach from the nearby town would alleviate that problem.

Therefore any federal agency — or private telecommunications supplier making claims for broadband accessibility — should be required to demonstrate that it complies with the FCC's definition, at the minimum, in its provision of broadband telecommunications services. That achievement would greatly improve the opportunities in rural areas for economic development comparable to that of cities and help to level the playing field between rural and urban communities. It works in Africa, why not in the United States?

A personal note on the price of broadband in the urb

The FCC-defined broadband speeds, at least for business access, are a mirage where I live. JALA is a small organization operating in that high tech region of the world: West Los Angeles. Our "broadband" access is via cable. We pay the cable provider $135 monthly in order to get 10 Mbps download and 1 Mbps upload to the Internet; 40% of the FCC's minimum standard for download and one-third of that standard for upload speed. To upgrade our service to surpass the FCC minimum bandwidth would increase our cost to more than $300 monthly.

On the other hand, if we were to switch to a residential subscription, hiding the fact that we're a business, our bandwidth could be at least four times the FCC minimum at a cost slightly less than that of our current cable service. The difference between business and residential charges is attributed (by the cable provider) to the supposedly higher data usage (wear and tear of the electrons) of business over residential activity as well as more rapid service response for businesses. It's not clear to us that we use more data services than a household with teenagers. In any case, monthly data consumption for non-business entertainment is expected to surpass 15GB per mobile device in the US before 2020.

Previous to our cable subscription our Internet access was by the local telephone service. In that case our maximum bandwidth was about 500 kbps for the same price as our current cable bill. Both the cable and telephone companies claim(ed) that our Internet access was "broadband". Yet broadband, as defined by the FCC, is simply not available at a moderate price even to millions of people in large American cities, much less to those living in rural areas. In effect, we are in a rural area within our second largest city