

Rural Broadband Advancement - Perspectives from the Field

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I. INTRODUCTION

First the disclaimers: I am neither an academic or a scientist, I am a technologist, entrepreneur, and a non-profit director focused on rural America's economic plight, particularly the youth. My observations are borne from field experience not academia. Suffice it to say that I subscribe to General George S. Patton's theory that "No good decision was ever made from a swivel chair." I also like the late W. Edwards Deming's¹ model for action: Plan, Do, Study, Act (PDSA). *Exemplary situations discovered in the field through small pilots can often uncover the non-technical factors that are often not well-represented in policy and funding decisions. It is easy to forget that at the other end of our grandiose infrastructure focus for rural America are people and communities whose needs are quite different than that of urban America.* I offer my observations into the human side of this equation in hope that we might actually see all of rural America's communities take full advantage of this singular opportunity to advance. We will likely not be able to afford another chance like this in my lifetime.

I want to thank Dr. Robert Atkinson of the ITIF for his scholarly article "*Framing a National Broadband Policy*" which was distributed at the National Broadband Strategy Call to Action in December of 2008 which helped me widen my considerations. My real motivator are the faces of the rural kids I meet every month in rural K-12 schools who are full of digital ambition and talent and simply need opportunity. It is to them we will be ultimately accountable for what we do with the singular opportunity to change their future.

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¹ The late American statistician W. Edwards Deming was the originator of the Total Quality Management (TQM) Theory. After WWII, the Japanese automotive manufacturing industry adopted his wisdom wholeheartedly and the American automotive industry adopted it half-heartedly – the result is self-evident 50 years later.

II. OVERVIEW

It is apparent that Congress has awakened to the fact that America needs a national broadband telecommunications policy if we are to compete in the global economy. There are now few, if any, left in Congress or at the state level of government in the U.S. that aren't aware of the competitive disadvantage that we find ourselves in due to our lack of this critical and necessary infrastructure. The rate of change in the world now is such that we can ill afford to miss this opportunity to correct ourselves in the rural broadband arena. **Anyone who feels that rural America can simply wait for market forces to fix their broadband problem does not understand the market or the problem.** The rate of rural loss of it's young people nationwide is at very disturbing levels. We will soon hit a tipping point of no return where, for many rural communities, long term viability will be difficult.

The world has evolved at a far faster clip than rural economic development has been able to adjust. The issue is far larger than just broadband connectivity. A holistic approach needs to be taken of which broadband plays a pivotal role. The global economy has strong virtual underpinnings. Doubters need only to look at the rapid adoption and influence of online social networking into the worldwide business environment. The Internet is not a passing fancy or an optional feature of personal or business life in the 21st Century.

Broadband availability and adoption is *directly* tied to the economic future of rural America. Ask any rural ECD person whose been trying to sell that disconnected Supersite to a potential developer who is asking for fiber optic levels of connectivity. Ask the HR director of a local manufacturing plant that needs new digitally savvy kids coming in the door to replace their aging boomer workforce. Digital workforce readiness cannot be laid solely at the feet of K-16 schools because online social skills are now 21st century business skills. You don't learn those in K-12 or college, you must experience them personally and learn how to link into a virtual community both locally and trans-locally; balancing an online life with the rest of your life. These are the *new* basic skills of 21st century business. Gen Y'ers, even disconnected ones, know this instinctively.¹ But let us return to the infrastructure issues as this deserves an entirely different treatise.

No detailed reiteration of how we arrived at this incongruous state between urban and rural broadband is necessary as it is not elemental to my

¹ In a recent rural 12th grade class I was teaching, I polled rural students about who had a computer at home (est. 75%); who had a broadband connection (est. 55%); who has a MySpace account – 98% had a MySpace account. Gen Y'ers know that social networking is important and make efforts beyond their own limitations to make it happen.

discussion or the solution. Let us just acknowledge that there is a wide gap in cost of delivery per subscriber and availability between urban and rural – this is not going away for terrestrial products under any current technology. Adoption rates as a percentage of population for most rural areas are highly likely to be much lower than urban areas for a number of years for reasons we will discuss later.

Prioritization of spending, sustainability, and adoption issues are just some of the dynamics that need to be well-thought out if we are to equalize how broadband can benefit urban and rural citizens. We need to thoroughly consider the dynamics that exist in rural communities before we assume that what works in urban areas is going to work in the majority of rural communities. *The core issues go deeper than equalizing last mile speed of access and availability.*

III. THE RURAL VALUE PROPOSITION

As a preface to this section let me say that there are plenty of “non-urban” areas that have starving masses of Internet-ready folks who could make good use of say, fiber-to-the-home. Those areas usually are directly adjacent to larger cities and full of outlanders who work in the city but live in country bedroom communities. Spoiled during the day by urban services, they go home to digital deserts. For those in such a state, may your fiber-to-the-home dreams come true.

The segment I would like to address are the communities two counties or more away from a major urban area who have seen a 47% decrease in manufacturing, a 85%+ loss rate of their college-bound kids who never return home, and who are wrestling with how their economies are going to survive.

Thanks to the efforts of Connected Nation¹ and many other organizations including my own, the hinterlands are now getting the message that the Internet is important and decision makers at all levels are beginning to see in graphic detail the true state of affairs. **However, the message that broadband is a *competitive local necessity* has not fully penetrated the minds of countless rural county commissioners, small town mayors, parents of rural children, and in some cases, the children themselves.** Having spent the good part of the last four years in the field talking to these folks, I can assure you that there is much still to do on the education front.

¹ See www.connectednation.org

Three reasons for this disconnect immediately come to mind:

- a. Many rural communities have not had their first generation of *home* broadband users emerge, while urban areas are well into their second generation. The Internet is not a daily part of rural people's lives to the degree that urban users are experiencing.
- b. Most online businesses that create tax revenue and local wealth are in urban areas, not rural areas. The obvious benefit of online small business and its location insensitivity has not been made clear to many rural stakeholders.
- c. Most rural areas have not developed digital communities of interest that are the catalyst points for a technology economy to become alive. These social networks take catalysts like universities or existing tech businesses to start.

We can't really blame them for this. There is a lot more on the mind of the typical rural county mayor and county commissioner than an investment in broadband. Maslow's Theory of Needs comes into sharp focus when dealing with rural communities and their value perception of broadband. There is even less understanding at the decision-making level in rural communities of the impact that social online networking has in business, career, social, and political advancement. To many rural leaders, sites like Facebook, Linked In, MySpace, and countless others are still novelties with little or no practical value to their local world.

A clear link must be built in the rural decision-maker's mind of the real and consequential economic and community benefit of the Internet.

We should not delude ourselves into thinking that all rural America "Gets It". There is much to be done on this front. We also need to understand that the value system of rural America is highly reticent at allowing the floodgates of the Internet into their homes. For predators, bilkers, and other undesirable characters on the web, the rural communities present a new green field. What needs to be made is a direct connection to the potential economic benefits to a rural community of broadband adoption.

A. Establishing a Value Proposition

To change the rural value proposition and drive adoption requires us to address the fundamental question of cost/benefit. Embarking on a grand building program without some type of balanced drive to create real social and economic benefit will leave us in a long curve to adoption and sustainability. Our current pilots are focused on modeling a process for establishing and hiring a digital workforce in rural communities. *As I have*

theorized to many: the first young person in a small town whose starting salary from his online job is 125% of his daddy's local factory job will make the point. In a rural area, such novel success is front page news. Parents all over town will be very curious what this kid does for a living and how can their kids can stay local and get that kind of work. The adults will follow rapidly the lead of tech savvy young people who can quickly adapt to the digital economy.

Conversely, the first person to lose their savings to some online scheme or their child to an online sexual predator will also be front page news. Small communities do not have the insulation of anonymity that urban life affords. News and attitude travels fast. We need very positive outcomes upfront to both develop the value proposition for rural adoption and also to build a local digital community that can educate the rest of the community in their own context.

Few rural communities have seen web companies in their neighborhoods that start from scratch and end up with \$8m in revenues and 50 employees in a few years. I have met plenty of smart young people in rural communities interested in the online world, who understand the online social networking world, have rudimentary digital skills, and are dying to learn more. What they lack is a local digital community catalyst and mentoring – not necessarily access to broadband. A few practical examples come to mind of what could change this dynamic:

1. Careers that have remote hiring potential such as web services, programming, digital marketing, digital graphics, technical support, etc. can immediately change the value proposition for adoption and program advancement in rural communities. This is a world that most regional and local ECD officials have no exposure in simply because the historical rural ECD drivers are manufacturing, retail, and agriculture - not “technology”.
2. Community benefit for rural communities can also be pragmatically demonstrated in areas such as slowing the current youth drain from rural areas.¹ This is a significant issue across the nation in rural communities and any program that brings hope to retain rural youth gets attention.
3. Another such driver is the development of a local Ag Tech cadre of young farm hands who can operate and manage precision agriculture² programs for

¹For a scholarly overview on this topic from Maine see usm.maine.edu/cepare/Reports/Where_They_Go_and_Why_PhaseII.pdf Most college-bound youth do not return to their rural communities. This has dramatic consequences for community social and economic long term viability.

² For those urbanites who haven't been exposed to this world, fertilization and harvesting on large farms are now done by GPS-driven machinery which are automatically steered to a precision of inches, outputs of fertilizer are metered by computer control, and harvests measured by volumetric technologies while the driver sits in an air-conditioned cab listening to their iPod and sipping a latte.

medium and larger farms. This is contextualization that makes immediate sense to the pragmatic, non-virtual rural universe.

The key success metric for our investment in rural broadband is not when rural equals urban broadband speeds. Equal infrastructure does not equate to equal opportunity. Like their urban counterparts, rural communities need to be “plugged in” to the online world on a self-sustaining basis. This only comes when the digital community within a rural region reaches a critical mass. The paradigms of what launched such communities in Boston or New York may not be applicable in rural Tennessee. New online social networking models may emerge from players in the rural market.

IV. HOW FAST IS FAST ENOUGH?

Thankfully we are now hearing that the FCC will update the definition of what constitutes broadband to a more global norm. While all this is wonderful, at the end of the day what constitutes *broadband value* to the rural community is not a matter of *last mile speed*, but of the rural user’s perception of the Internet experience and its value in daily life. This is a highly subjective and regional proposition for different areas of the country. *Not all rural areas are made alike.* The USDA is well-aware of this dynamic.

Propositions such as funding fiber to every rural home is of little perceptible value when one’s cell phone still doesn’t work at your country home. In fact, such grandiose plans can have exactly the *opposite* effect intended and be seen as a wasteful government action that is even more out of touch with the rural needs and realities of life. Some rural communities are facing double-digit unemployment; many rural schools have old computers and first generation wireless; the school buildings are in need of upgrades and repairs; and many rural community police do not have computers or radar guns in their cars. These are first in line in the rural mind, not fiber-to-the-home.

We must build into our thinking the wise concept of intermediate and appropriate technology which E.F. Schumacher set forth over 30 years ago.¹ **Just because a thing can be done in one arena of technology does not make it appropriate for universal and instant application.** To propose that the standard for all broadband everywhere needs to be at least 5Mbps or 25Mbps or its not worth funding could have some unintentional – or intentional – side effects to full sustainable and affordable penetration of rural areas. This type of policy is an excellent way of squeezing out wireless providers of all types. We have need to put a human face back into the rural

¹ E.F. Schumacher, *Small is Beautiful – Economics as if People Mattered*, Harper and Row, 1973. Amazing guy whose balanced perspective on the human factors of economic development and the environment are still relevant. His observations of our future in 1973 were quite prophetic.

broadband equation and consider that an incremental path might be of the highest value for the real beneficiary – the rural resident and rural community. The human considerations of the rural audience and their adoption to change have received little attention in our rush to “equalize”.

A. Life From the Rural User’s Perspective

We are now hearing from certain sectors that we should just get it over with and wire all of the U.S., including the rural U.S., with Fiber-to-The-Home (FTTH). The argument follows the attractive, politically correct, tree-lined avenue of equalization of *access speed* between urban and rural communities which has been the guiding principles of telecommunications policy.

“Why should the rural communities be treated as second class citizens and not have fiber like their urban brothers?”, the proponents ask. This type of over-simplified thinking can lead us to waste billions of dollars on rural FTTH programs that will, in the end, not solve the everyday *personal and business communications issues* (voice and data) of rural America, and do little to change the everyday experience of the rural citizen, or the quality of their lives.

Can we understand what this looks like from the other side of the Beltway? FTTH in most rural areas is neither sustainable by carriers nor prudent. Do we need fiber in rural areas? Absolutely. How about wiring the central offices, cable headends, and cell tower of every micropolitan community of 5,000 people or more so we have a decent backbone for the basic services? That would be a nice, sustainable start. More on this later.

The other perspective that is lacking is what life looks like for the typical rural user who has never seen a broadband connection. They are not likely to have the latest computer equipment, or to have the fastest home wireless networks. Many of them have been stuck on dial-up for years and have had promises made by carriers that “its coming”. They may have tasted broadband at a library, at a friend’s house, etc. They are looking to do what typical Internet users do. Rare is the “power user” in rural communities as they have not had time to hatch en mass due to lack of a *digital social environment*.

If we can determine what access would meet the vast majority of speed needs in a particular rural area, we could then optimize the spending for each region accordingly and spend wisely. For this approach we must ask the question “*How fast is fast enough?*” Let’s explore that topic next because the dynamics of what makes the Internet “fast enough” for an end user cannot be measured by a broadband speed metric alone.

B. What Makes the Internet “Fast Enough?”

Some empirical logic would assist us in forming a basis for figuring out the rational answer to this key question. A universally reasonable perception of “fast enough” might be that when a user clicks, their expected result happens in less than one second. That might be a screen popping, up, a movie starting, or a voice call goes through. I think we would all agree that would be “fast enough” from any typical Internet end user’s perspective. I would certainly like that at my house but that is far from most urban or rural user’s reality or expectation. We all have our own perception of what is “fast enough” based on a value proposition that we have knowingly or unknowingly built in our minds.

I could buy a Metro Ethernet circuit to my house in Nashville tied directly to say, the Level 3 Point of Presence, so I am directly on the Internet backbone. That would be very fast. Why don’t I do that? The value proposition in my head says the cost is not worth it. I would love the speed but not the price tag which would be thousands of dollars a month. Similarly, a typical rural dial-up user also has a value proposition in their head which says “I would gladly pay the \$39.95+ a month for broadband if I could get it. Some even go for paying \$99 a month for a satellite link but the reality is that they would drop that in a moment for a less expensive, lower latency solution like wired/wireless DSL, cable, or 3G cellular. *They are looking for a superior quality experience that is better than the current situation.*

These days, “fast enough” has to just as much with *quality of service* as it does with *quantity of service*. Take someone trying to watch a streaming video or trying to talk on a VoIP call. “Fast enough” for those items has much more to do with reliable packet delivery - not quantity of packets delivered. For a rural dial-up user, basic DSL may be perceived as “fast enough” while an urban user would perceive this as “slow”.

The point is that the perceptions of good response time for any user on the Internet is subjective to the *user’s cumulative experience to date* and also the result of the interaction of some basic factors which we rarely hear anything about in all this talk about bandwidth.

Here’s a few basic factors that directly affect the user experience on the Internet:

- I. The computer, its browser, and operating system e.g. Is it a new MacBook Pro running Leopard and Safari, or an old Intel Celeron running Microsoft XP & IE ?
- II. The local area network (LAN) e.g. Ethernet, Wi-Fi
- III. The wide area network connection (WAN) i.e. *the FCC definition of “broadband” e.g. 256kbps, 768kbps, 10mbps, etc.***
- IV. The routing and congestion of the Internet provider e.g. Is it 20 router hops to the web server or 10?; Are you connecting at 2pm or 2am?
- V. The response time and busyness of the web server

VI. The type of element being requested across the network e.g. movie, simple text, VoIP, audio, file transfer, Flash, etc.

VII. *The expectation in the user's mind of "fast"*

My experience in helping to architect one of the first statewide K-12 networks in the U.S.¹ at Education Networks of America (www.ena.com) gave me some unique insights into how these elements work together. The last mile wide area speed definition is only one factor and can be completely negated by inefficiency in other factors.

In the test lab at ENA we initially identified 83 different combinations of operating systems and browsers used in our public K-12 schools in Tennessee. There were drastic differences in the end user web experience for each of these on the exact same "broadband" (WAN) delivered connection speed.

Teachers at one school with a full 10Mbps of Internet access but with older computers and an older internal network, can have a significantly worse user experience than a teacher at a school with just 3Mbps to the Internet, but newer computers and a new internal network. The local computing and networking factors are highly significant in the ultimate end user response time. **No amount of last mile bandwidth size and "broadband speed" can equalize these external factors.**

Another major consideration is the distance in router hops from the end user to the requested server and this is a direct result of the ISP's network design. *The difference between going 15 router hops to a web server versus 5 router hops is enormous and cannot be made up for by any amount of size at the last mile pipe to the end user.*²

A more prudent order of spending is for carriers in rural areas to focus on building strong fiber backbones and multiple Tier 1 egress points. A rural cable or DSL customer's typical experience on a rural network that can deliver Google in 5 hops could, at times, be found "equal" to some urban FTTH project that takes 20 hops to get anywhere and is running a congested route. This of course doesn't apply if you are trying to upload some huge files but for the typical rural user well outside an urban area, this is not generally the case and will not be generally the case for a number of years to come until a tech community is born.

¹ www.ena.com/aboutus/ ENA is the largest private ISP in the U.S. providing Internet services to the K-12 community, TN, IN, FL, and soon ID. The first Tennessee statewide K-12 network had with 200,000+ computers at 1800 education end points.

² Try this at home kids: Open a Windows Command prompt and type: "tracert www.google.com". Mac users: open a Terminal and type "traceroute www.google.com". My home DSL is 14 hops away from Google and I'm in an urban area. Typical ENA school is <5 hops from Google.

The point: *We must liberate our minds from the simplistic yardstick of last mile speed as the great equalizer and think in the context of the rural audience we are trying to serve.* This will assist us in spending wisely our limited dollars.

B. Shifting the Success Metric

If we focus simply on the goal of a ubiquitous, as-fast-as-possible wired rural last mile broadband that is equal with urban areas, we will potentially spend billions and still not be better for it. The rural user who has been stuck on dial-up for the past 10 years will think even basic wired or wireless DSL or cable is “fast enough” for quite awhile. They will most likely be open to even faster service when such service is practical and affordable, but the next real dissatisfaction plateau will not be reached until their online life *requires* something to be delivered faster than 3G/4G, DSL, or cable can effectively. **Given the realities of the pace of rural community life, this new dissatisfaction plateau may be immediately for a very few people, 4-10 years for many, and maybe never for others.**

For a broad swath of rural American society today, the last mile broadband bandwidth needed to participate in the current “basics” of the global online digital society i.e. online commerce, digital socialization, general business and pleasure surfing, does not require one to be wired with connections above what DSL or cable can provide. There are many 3rd generation urban users who are at least functional at these speeds, why is suddenly *not* true for rural areas who, in many cases, have not seen even their 1st generation of Internet users?

In fact, a growing number of online applications that are truly the day-to-day bread-and-butter of our digital life styles are becoming *less* bandwidth intensive and more mobile. Witness the power and popularity of *mobile* applications such as Twitter or the practical tools in the Google Apps toolbox, most of which do not require extraordinary broadband speeds to provide a satisfactory user experience. Redefining our metric for success will require a region-by-region analysis and approach and a realistic view of what rural users will actually be doing with the Internet. At some point, rural communities must become sustainable in adoption and demand levels if we hope to have solid ISP’s operating these far-flung areas. Overbuilding capacity will not do that. The telecom mess of the late 90’s should have hopefully taught us that the rural market must eventually buy all this infrastructure we are planning.

Our federal piggybank is not bottomless. We still need speed definitions simply because it is the one hard metric we can measure but we can’t think the job is done because we’ve equalized speeds between urban and rural. Other success considerations need to come into play such as adoption, sustainability, prioritized need and others.

How do we get to these other success metrics?

V. Logical Steps Forward

A. Sustainability Considerations

However well capitalized, no telecom project is immune from eventually facing the adoption and sustainability question. Networks take money to operate. The more extensive, exotic, and complex the network, the more overhead it will take to operate and maintain. The telecom bubble of the 90's should have taught us that much along with many municipal WiFi projects that have hit this wall. The realities of this need to be front and center for the agencies like the RUS who are examining the "shovel-ready" projects that are being considered. In terms of readiness, we should be more concerned with spreadsheets that shovels. What types of safeguards can Congress require to ensure that we are not building digital bridges to nowhere?

Here's a few considerations:

1. **Dial-Up Surveys.** I have never see any official stats on this but ISP's tell me the conversion rate for dial-up Internet users to broadband exceeds 90%. It seems logical to find out where these users are and ensure that last mile broadband expansion plans are specifically targeted at this group. This not only makes sense from the user's perspective, but from the carrier's perspective as well since this is practically guaranteed ROI. We did such a survey in Lauderdale County, Tennessee and gave the data to Connected Tennessee who then crunched it into maps. This data was then distributed to the local carriers and our organization used it to identify the most likely spot for USDA Community Connect Grant. We won the grant and this carrier has a very high probability of sustainability.

Every shovel-ready project for wired end-user connectivity should be forced to invest in finding out what the market demand is before their shovels are turned loose.

2. **Identify Rural Supersites and Industrial Parks.** Rural Supersites are the key to future regional growth for certain rural communities, particularly in the south. Supersites are typically land reserves of 1000+ acres that are under option or have been purchased to attract large ECD projects. Tennessee has been knocking the Supersite ball out of the park with two major wins in 2008 including the largest investment in state history.¹ These locations should be high priority targets for pre-positioned cellular and broadband coverage including fiber, *even if no one is living in the area.* Carriers on their own volition won't see that but the local ECD folks will tell you both cellular and high speed broadband are on any searching firm's

¹ <http://www.siteselection.com/features/2009/jan/Super-Sites/>

checklist who is looking at a Supersite location. The local ECD, USDA and EDA reps will know where these areas are located and this information needs to be fed to grant-making bodies like the RUS for prioritization.

3. Map Cellular Coverage Areas. A combined effort by the FCC and the USDA fed into an agency like the RUS can produce a look at the true state of our cellular coverage. The FCC can provide the current tower locations, active licenses, and some type of estimate of coverage areas from the licensed carriers operating on those towers. We may not know the exact services provided from every carrier but we will have a pretty good idea.¹ The USDA can provide the on-the-ground sanity check for what areas are in the most need of coverage based on population density and economic profile. The RUS can oversee the production of maps that will identify areas where cellular expansion has the first priority over any wired or dedicated wireless data expansion. This mapping may exist somewhere already.

Cellular voice and data coverage has the highest sustainability potential of any rural access method and is an absolute necessity for the lowest tech farmer or the highest tech Supersite prospect – it is a must. It will also open the doors to many users for their first taste of broadband speeds through tethering phones and cellular modems. They eventually will want more/better/faster/cheaper hard line services and drive wired network adoption.

B. Prioritizing Need by Region.

There is no “one size fits all” for fixing our rural broadband issue. Each county of the U.S. has its own challenges that must be considered individually. If we are going to spend billions of dollars, let us at least prioritize the need so when we are finished we have made a difference.

a. Cellular First. The basic need for wireless voice communication for both personal and business needs is unquestioned. Many rural areas simply do not have *any* coverage for cellular *voice* much less data. Many rural areas of the U.S. simply have no cellular *voice* coverage at all. If there are limited funds, then the region must have cellular voice first. Simply connecting the home and business of rural communities to wired services is not enough to ensure rural attractiveness to new business. Driving down major rural routes or standing in the Main Street of a small town and experiencing no signal on your cell phone does not bode well for attracting new business, sustaining existing business, or local life in general. I can take you to lots of rural places in the middle of small towns where this is still the case.

¹ It seems that wireless carriers could take FCC publically available data and figure out exactly where their competition is in any region. If we are going to give billions to wired carriers for expansion, the public should know graphically what areas they are covering and the cloak of secrecy needs to be abolished, particularly if they are taking public funds.

Building rural wireless cellular networks need to be factored into our thinking about “broadband” for rural areas. Mobile broadband access is rapidly becoming as or more critical than fixed broadband for the daily user experience even in urban areas. I know I use my mobile broadband access as much or more as my fixed broadband access. In fact, from a work efficiency standpoint, mobile data access is far more important to me than my fixed data access.

Projects to provide cellular wireless voice coverage should have first funding priority and these systems should include advanced data services. This will take thousands of new towers and thousands of miles of new cellular backbone. In areas where adoption and demand for broadband is weak, mobile broadband applications may be the bridge to show how broadband access can benefit one’s daily life.

b. Fiber Backbones. All rural communities need fiber backbones to central offices and headends that can provide local metro Ethernet in the community and high speed egress to Tier 1 facilities for carriers. This will help bandwidth-hungry schools which are found in these small communities keep pace, rural healthcare clinics to be equipped with advanced services, and cable, DSL and cellular networks to keep pace with local demand for many years. The wholesale fiber models must be open and fair and allow all carriers access. Redundant fiber routes need to be well-thought so areas do not find themselves hanging at the ends of single entrance routes.

c. DSL and Cable. These access methods are tried and true and for most rural users, will meet the 80% rule for getting users access to basic and advanced online services for quite a long time. The infrastructure is well-known, cost-effective, and already supported in most areas by carriers so it can be rapidly deployed. Sustainable cost efficiencies of using existing access technologies just make sense until the rural demand for services requires something faster and better.

d. Rural Fiber-to-the-Home. As pointed out previously, the business case is impossible to make for spending the kind of money it will take to wire rural America for FTTH. From my perspective in the field, rural America has some significant catching up to do before FTTH is cost-effective and sustainable for most rural carriers. The exception might be in micropolitan areas that are building new tract housing developments or certain urban bedroom communities that happen to be in rural counties. In my opinion, FTTH does not make sense for the bulk of rural America for many years to come because the cost/benefit to the majority of the end users has not been demonstrated and hence, is not sustainable. This concept has been extrapolated from urban experience which is not applicable for the vast majority of rural America. Please don’t take me to a county one step from Seattle to try to make your point. As pointed out, communities one step from a major urban center most likely do have a FTTH business case. That business case should be funded by

normal 20 year capital expansion plans of the carriers – not funds desperately needed by rural communities that have little or not options.

VI. Conclusion.

Few would argue that rural America cannot wait any longer to see both cellular voice and data, and wired broadband infrastructure become a reality. **What must be adjusted is the over-simplistic focus on equalizing the urban and rural experience by measuring speed of connection alone, and thinking that rural users and urban users of broadband have the same needs.**

We must look at how our plans will impact the daily life of the typical connected or unconnected rural citizen. Our limited funds should be spent in deploying services that enhance the lifestyle they desire, not what urban planners think their broadband lifestyle needs should be.

Programs that drive the adoption and daily, practical utilization of Internet-based services need to be rolled out at the same time as the new services are rolling out.

Sustainability cannot be neglected. Agencies should be requiring some type of real market survey which shows the likelihood of adoption of last mile services being proposed and how the carrier expects to recoup the investment. Digital bridges to nowhere need to be discovered before we fund them. Those demonstrating strong local demand and are willing to be measured by their adoption outcomes should be high on the list. Priority should be given to regions that are proposing both infrastructure and ECD, health and education programs that leverage the new infrastructure and create some type of sustainable demand. This will require some out-of-the-box funding mechanisms since the current rural development programs are scattered throughout many agencies. I am finding this out the hard way.

Rural America has incredible potential for economic transformation online. I have seen it up close, I talk to the K-12 kids bursting with energy and a desire to connect to the larger online world - I know it is possible. Hopefully the next 4 years will allow us to implement both the infrastructure and the education and economic development drivers to make rural America the next frontier of hope for growth and prosperity in the online world.

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