

Chapter 12

Universal Rural Broadband: Economics and Policy

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12.1 Introduction

The primary reason that current government policy is failing to achieve universal rural broadband is rooted in its own past statutory and regulatory policy. The two biggest roadblocks are the rural waiver provided for in The Telecommunications Act of 1996 (hereafter cited as the 96 Act or Act) and the disastrous policy for (mis) allocating radio spectrum. Unless and until substantial reform or repeal of these policies occurs, the achievement of universal (affordable) rural broadband will be elusive. The most recent government initiatives, including massive “stimulus” spending, will not result in a marked difference over what could be achieved without it; what begins as a perfectly reasonable proposition for stimulating rural broadband, ends up being a struggle among entrenched special interests over pots of taxpayer money. The result is that a small amount of network infrastructure investment and construction jobs will be added, but the industry segments with the most growth will be lobbyists and bureaucrats. Fixing the problem is straightforward: eliminate entry barriers from rural waivers, reduce tariffs for network interconnection, target direct subsidies in a technologically neutral fashion, and reform spectrum regulations.

12.2 The Political Economy of Rural Broadband: A Case of Regulatory Schizophrenia

Nearly everyone agrees that universal rural broadband service is a laudable objective; for years it has been the stated objective of government. Substantial taxpayer funds are allocated to rural broadband projects, but progress is woefully inadequate; in large part

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due to policies that ignore economic cost and benefit and a variety of institutional factors and lack of leadership. Government press releases are full of rhetorical grand pronouncements about policies promoting investment in rural broadband networks.¹ In fact, real-world actions belie the vision. Politics trumps policy: this is the essence of regulatory schizophrenia. If the government were really serious about promoting investment in rural broadband, their first priority would be to get rid of long-standing institutional barriers to entry including inefficient rural telco subsidy mechanisms, rural competition waivers, high interconnection costs, and radio spectrum restrictions. Leadership and statesmanship is required to overcome regulatory roadblocks.

This chapter discusses the efficacy of public investments and compares that with what might be achieved if coupled with rational policies promoting economic welfare. Wyoming, the highest-cost state in the lower 48, serves as a case study to illustrate the vast differences in what is achievable versus actual (likely) results.

Numerous treatises have been written about the economic benefits of broadband and the problems and opportunities posed by extending broadband into rural areas.² Unfortunately, a lot of the “research” is the product of a public or private entity that is biased in one way or another by institutional constraints placed on them by those funding or otherwise responsible for the work. This chapter highlights deficiencies in the research record and condenses myriad issues to promote a fundamental understanding of institutional problems and the perverse incentives created and makes recommendations to fix them.

There are two critical ingredients to a successful program to achieve universal rural broadband: A high level of investment in network infrastructure and low prices for consumer equipment and usage. Various government initiatives have been passed to promote investment, provide public subsidies, and reduce usage prices for both consumers and service providers. In fact, if one could simply rely on the glowing rhetoric of government initiatives, there would be no doubt that the United States would be rapidly moving in the right direction. As usual, the devil is in the details and this is where the breakdown occurs; invariably a host of regulatory roadblocks pop up to delay or undermine the objective.³ The bottom line result is that little actually gets done.

If skeptical of this assertion, consider the evidence. Examples of regulatory schizophrenia abound for everything from competition policy to radio spectrum policy to pricing network usage; the result is higher costs, repressed demand and attendant reduction in consumer welfare. The details of failed policies in the

¹ For an update on broadband regulatory initiatives, see Federal Communications Commission (FCC) (2011a).

² For example, see the article and references in Dickes et al., 4th Qtr. (2010); for a comprehensive global perspective including research references, see: International Telecommunication Union (2011).

³ Dickes et al. put it succinctly: “Unfortunately, the *status quo* system of broadband providers is unlikely to offer service to the most rural communities or enhance existing service in already underserved rural areas. Current suppliers operate under a complex array of government regulations, subsidies, and market protection, which provide little incentive for these firms to alter the *status quo* structure.”

following sections lay bare the hollow promises of policymakers' claims of large increases in jobs or subscribers.

12.3 The Infamous Rural Waiver

The 96 Act called for sweeping reforms to promote competition to traditional telephone companies, even in rural areas. Section 251 of the Act imposed a host of obligations on incumbent telcos to accommodate competitive entry and nondiscriminatory interconnection. But the government was already subsidizing smaller rural telephone monopolies for their existence, and it was deemed necessary to grant them a rural waiver lest they be subjected to "harmful" competition.

Section 252 of the Act provided for a grievance resolution process whereby entrants could challenge a rural telco's decision not to comply with requirements of Section 251. But the process was rather nebulous, causing confusion and drawn out litigation, thereby perpetuating the barrier to entry. Rural telco subsidies and the rural waiver provisions endure to this day.

On May 25, 2011, the Federal Communications Commission (FCC 2011b) issued a declaratory ruling with a goal of limiting the use of the rural waiver. This ruling is an important first step to clean up the hodge-podge of state-by-state rulings regarding rural waivers: "Thus, we believe that a uniform, national policy concerning the scope of the rural exemption is necessary to promote local competition, prevent conflicting interpretations of carriers' statutory obligations under the Act, and eliminate a potential barrier to broadband investment."

It is about time; this issue has been on the table and in need of a solution for many years. Had this ruling been made years before, it would surely have made the massive subsidies in the 2009–2010 stimulus spending more effective.

Rural telcos have every incentive to preserve the rural waiver and they have the political clout to do it. In order to get rid of rural waivers and, in turn, costly and time-consuming litigation, lawmakers must practice some statesmanship and take on the task of crafting a new efficient subsidy mechanism.

Rural telcos are not only concerned about maintaining their federal subsidy, they are acutely aware that a broadband supplier entering their market will potentially cause customers to cancel phone service altogether. Once a subscriber purchases broadband access, it is easy to make phone calls over the broadband connection using voice over internet protocol (VoIP). The latest VoIP technology is a near perfect substitute for traditional phone service and is much cheaper. Most VoIP plans offer unlimited local and long-distance calling for a small flat-rate monthly charge, much lower than rural phone bills with high call charges. It is natural that incumbent rural telcos would try hard to keep broadband providers out of their market because they risk losing major revenue streams and losing the "stranded" assets associated with subscriber phone lines.

Still, rural waivers and federal and state tariff rules allow small rural telcos to charge outrageously high usage charges for long-distance calls and for

interconnecting carriers' originating and terminating traffic. It is straightforward to fix this: generate the entire subsidy required via a competitively neutral and technologically neutral revenue surcharge. Basic economics dictates that if one must have a subsidy, that it be implemented in a way that does the least amount of damage to public welfare. That means one needs a sustainable and nondiscriminatory subsidy mechanism that generates a minimum but sufficient level of funds for rural telcos to provide basic service. Once this is achieved, then regulators can mandate low (or zero) tariffs for network interconnection allowing call prices to fall dramatically.

Many years ago, the FCC's policy analysis recommended switching to an economically efficient subsidy system that did not collect money from usage charges or carrier interconnection charges; this transition started way back in 1984.⁴ But progress has been painfully slow; subsidies continue to be collected via usage-based charges and continue to hinder rural broadband deployment.

There is an economically efficient option called a revenue surcharge. This is a much simpler and efficient subsidy regime. Rather than charging different tariff rates for access lines or usage for different types of network providers, this alternative would place a competitively neutral flat rate surcharge on the revenue of all service providers, despite whether or not they are regulated and no matter what technology they use. It is easier to force reporting of revenues than it is to measure network lines and usage, both of which are subject to misreporting, cheating and various arbitrage schemes carriers use to game the current system.

This problem is inscrutable, especially for small rural telcos with limited resources; it is better to scrap the flawed system rather than spend the time and effort to try to mitigate it. It is expensive and exceedingly difficult for a small telco to examine and verify all traffic that originates or terminates on its network in order to accurately bill for it. But something has to be done because it involves a huge amount of money and traffic.⁵ For years, the FCC has struggled with these problems and has yet to find a way to stop it. A solution to this problem is not in the cards in an environment where carriers self-report their usage. Even though it is obviously the right thing to do, it will take backbone and statesmanship for lawmakers to challenge the *status quo* and propose a new revenue surcharge regime to replace the current convoluted system of usage charges.

12.4 Radio Spectrum Policy

It is easy to see how reforming radio spectrum policy could go a long way toward achieving universal broadband. First, due to topography in many rural areas, broadband access via radio spectrum is the best technology choice. Second, since

⁴ For some history of the transition of subsidies from usage-based charges to fixed monthly charges, see Congressional Research Service (2002).

⁵ For example, one small telco reports that about 20 % of traffic is unidentifiable. Private communication from Ron McCue, President/C.O.O., Silver Star Communications.

there is little to no demand for radio spectrum in remote sparsely populated areas, there is no threat of harmful radio interference proscribed by the FCC.

So, what is the hold up? Government rules are; ever since Congress passed laws requiring the FCC to auction licensed spectrum, it has continued to manage radio spectrum with an eye toward maximizing auction revenues rather than consumer welfare. This is another clear case of regulatory schizophrenia; righteous policy rhetoric about doing the right thing is undermined by real-world institutional roadblocks. Like most government policies, spectrum policy is greatly influenced by entrenched special interests and their lobbies. There are industry fights over the use of public airwaves for serving lucrative urban markets and little industry support for rural initiatives. Again, the government must practice some statesmanship, take the lead, and make necessary reforms.

It is an understatement that progress has been slow. Almost a decade ago, the FCC (2002) produced a Spectrum Policy Report and a number of reasonable recommendations for spectrum reform in rural areas were proposed; yet, to this day, no significant progress has been made. If anything, the situation has actually gotten worse.

For example, in order to provision a broadband access facility to serve a rural enclave, it is usually cost-effective to construct a single antenna with 360° coverage using licensed radio spectrum. This type of FCC license, called a P35, used to exist for “wireless” cable TV service and permitted a radio coverage area for up to 35 miles radius. However, the FCC eliminated this type of license and instead folded these small area licenses into the much larger geographic areas licenses typical of those used by large players (e.g., AT&T, Verizon) serving dense urban markets.

Large players value licenses that cover large geographic areas and the FCC accommodates them by expanding the license coverage areas. While it is fine for the FCC to design auction licenses to maximize auction revenue, the unintended consequences for rural areas is a disaster. The auction winners end up with exclusive rights to serve vast geographic areas, but naturally they only want to build networks where it is profitable to do so. People that reside in those vast rural areas are the losers and, once the government auctions are over, it is difficult to undo the damage.

Large players view it as a hassle to share their spectrum with others that may want to serve rural enclaves within the license area. Any fees the auction winners might receive from their “partner” would not justify the risk and potential legal liability. Besides, larger players believe that, some day, a new technology might come along that would allow for expanding their own coverage into rural areas. In any event, the historical record is clear: When it comes to giving up your exclusive rights to spectrum use, incumbents will fight tooth-and-nail to keep what they have forever. Just the thought of setting a precedent for voluntarily sharing spectrum is scary for incumbents. Lawmakers and the FCC know full well the powerful industry resistance to spectrum sharing and should have set auction rules that carved out licenses to promote rural network investment. It will not be easy to remedy this situation, and true statesmanship will be required to overcome the

wrath of license winners or others who were previously endowed with exclusive spectrum rights.

The FCC has noted the problem that large players do not have sufficient interest or incentive to extend wireless access into small rural enclaves and has tried in vain to mitigate the adverse effect of its spectrum policy. The FCC has studied the problem and initiated policies for advocating the leasing of rural spectrum rights and proposed some flexibility in rules governing maximum power for transmitters in rural areas and relaxed interference parameters. None of these has had any significant impact, so regulators have to step up and deal directly with the lack of cheap licensed spectrum by allocating more to rural use or forcing sharing of licensed spectrum.

Two policy reforms are called for. First, the FCC needs to revive the small area antenna license. Second, idle spectrum must be made available for use in rural areas. There is a physical abundance of unused radio spectrum in rural areas and it makes sense to put it to good use. For example, there are no TV broadcasts in many rural areas, so the FCC should allow rural broadband providers to use that spectrum.

12.5 Public Subsidies

For some time, regulators and other government agencies have tried to increase investment in rural telecom infrastructure via direct and indirect subsidies. Most recently, as part of the American Recovery and Reinvestment Act of 2009 (ARRA 2009)—known as the stimulus package—Congress required the FCC to deliver a National Broadband Plan. The National Broadband Plan (NBP) was released on March 17, 2010 (FCC 2010). The NBP set a broadband availability goal that: “every American should have affordable access to robust broadband service, and the means and skills to subscribe if they so choose,” and cited a “broadband availability gap” of seven million housing units that do not have access to terrestrial broadband infrastructure capable of download speeds of at least 4 Mbps. The FCC estimated that \$24 billion in additional funding would be necessary to fill the gap. This implies a subsidy of \$3,429 per household to fill the gap.

Historically, the primary source of rural subsidies was the universal service fund (USF) and its various targeted programs. While not explicitly designed to subsidize rural broadband, funds provided by the USF high-cost program, low-income program, schools and libraries program, and rural health care program included network investments that support broadband.⁶

⁶ The Universal Service Administrative Company (USAC) administers the FCC’s USF Program. For a basic tutorial on USF programs, see USAC and the USF: An Overview, March 2011, http://www.usac.org/_res/documents/hc/pdf/training-2011/USAC-and-High-Cost-Overview-March-2011.pdf.

The FCC recently announced major reforms in its USF fund to redirect subsidies from promoting plain old telephone service (POTS) to broadband access. The new Connect America Fund (CAF) was announced on November 18, 2011: “The CAF—with an annual budget set at no more than \$4.5 billion, the same as the current universal service funding level—is expected to help connect 7 million Americans to high-speed internet and voice in rural America over the next 6 years, generating approximately 500,000 jobs and \$50 billion in economic growth over this period. Main Street businesses across the country will benefit from the opportunity to sell to new customers throughout the US.”⁷

The FCC’s CAF Order does not provide any detailed technical analysis to validate its forecast of new broadband subscriptions in rural areas or additional jobs it creates. Whether or not the FCC’s overall forecasts are correct, its plan to transition from USF to CAF represents a courageous attempt to implement major reforms in numerous areas of competition policy and probably qualifies as the most ambitious undertaking, the Commission has ever attempted. There are lots of refreshing statesmanlike pronouncements in the Order and it will take real statesmanship to see it through the political and judicial challenges it faces. One can only hope that the FCC’s wide-ranging proposals in the CAF Order and Notice actually come to pass, the sooner the better.

Do not hold your breath; the various transition mechanisms that have to be developed and implemented are complex and will only occur slowly over time, if at all. As usual, the FCC tempered its CAF plan reforms in the case of politically powerful rural telcos and there remains some wiggle room for small telcos that currently qualify for rural waivers to continue to delay implementation.⁸ But apparently that is not enough; in an attempt to block proposed reforms, the small telco industry lobbies have already filed a petition to reconsider the CAF Order.⁹

Considering everything the FCC is attempting to do in the transition to CAF, it is worth taking a step back and to imagine a simpler, less onerous, and much less costly regulatory framework. This is akin to simplifying the tax code, if policy-makers can take the political heat. The FCC rules are so complex that it is a full-

⁷ FCC 11–161, Report And Order And Further Notice Of Proposed Rulemaking Adopted: October 27, 2011 Released: November 18, 2011. Full text is available at: <http://www.fcc.gov/document/fcc-releases-connect-america-fund-order-reforms-usfcc-broadband>.

⁸ *ibid*. In particular, the FCC declined to review or make any changes in state-by-state carrier of last resort (COLR) rules, and the amount of subsidy from the old USF fund to small rate-of-return telcos will remain the same at \$2B per year, through 2017. Also, see p. 42 “*Waiver*. As a safeguard to protect consumers, we provide for an explicit waiver mechanism under which a carrier can seek relief from some or all of our reforms if the carrier can demonstrate that the reduction in existing high-cost support would put consumers at risk of losing voice service, with no alternative terrestrial providers available to provide voice telephony.”

⁹ The petition urges the FCC to reconsider key aspects of the CAF Order: sufficiency of budget for high-cost universal service, capping mechanisms, and waiver standards. See Petition For Reconsideration and Clarification of The National Exchange Carrier Association, Inc.; Organization for The Promotion and Advancement of Small Telecommunications Companies; and Western Telecommunications Alliance. December 29, 2011.

time job just to understand a fraction of them. Fundamentally, the CAF plan is to get rid of barriers to entry and subsidize broadband where it is otherwise unprofitable to provide—sounds simple enough. But, if the transition requires that you have to do that within the institutional and political constraints of all the past layers of incremental regulatory programs, you end up torpedoing the objective. It is better to start with a zero-based budgeting approach, or perhaps terminating, and grandfathering, all the old programs—phasing them out while the new simpler rules guide the future.¹⁰

Other government subsidy programs are administered by the United States Department of Agriculture (USDA) Rural Utilities Service (RUS). For many years, it offered limited grants and preferential loan terms to rural telephone companies to expand and improve network facilities for POTS; since 1994, it required funded projects to be “broadband capable.” Since 2002, the RUS Rural Broadband Access Loan and Loan Guarantee Program directed funds to its client companies to expand broadband networks. All of this pales in comparison however to the stimulus package funding.

12.6 The Stimulus Package

ARRA allocated over \$7 billion in subsidies to stimulate rural broadband coverage. The purpose of the program was to “provide access to broadband service to consumers residing in unserved areas of the United States” and to “provide improved access to broadband service to consumers residing in underserved areas of the United States.” The funds are awarded for project proposals in two separate but related programs, National Telecommunications and Information Agency

¹⁰ To drive the point home for those who do not work on this full time, the following passage from the Executive Summary of the CAF plan document (p. 12 of 751!) should suffice.

27. Alongside these broadband service rules, we adopt reforms to: (1) establish a framework to limit reimbursements for excessive capital and operating expenses, which will be implemented no later than July 1, 2012, after an additional opportunity for public comment; (2) encourage efficiencies by extending existing corporate operations expense limits to the existing high-cost loop support and interstate common line support mechanisms, effective January 1, 2012; (3) ensure fairness by reducing high-cost loop support for carriers that maintain artificially low end-user voice rates, with a three-step phase-in beginning July 1, 2012; (4) phase out the safety net additive component of high-cost loop support over time; (5) address Local Switching Support as part of comprehensive ICC reform; (6) phase out over three years support in study areas that overlap completely with an unsubsidized facilities-based terrestrial competitor that provides voice and fixed broadband service, beginning July 1, 2012; and (7) cap per-line support at \$250 per month, with a gradual phasedown to that cap over a three-year period commencing July 1, 2012. In the FNPRM, we seek comment on establishing a long-term broadband-focused CAF mechanism for rate-of-return carriers, and relatedly seek comment on reducing the interstate rate-of-return from its current level of 11.25 %. We expect rate-of-return carriers will receive approximately \$2 billion per year in total high-cost universal service support under our budget through 2017.

(NTIA) Broadband Technology Opportunities Program (BTOP)¹¹ and RUS Broadband Initiatives Program (BIP).¹² Stimulus spending was supposed to be for so-called “shovel ready” projects and funded projects must be substantially (i.e., 67 %) complete within 2 years and fully complete in 3 years. As of April 2011, only 5 % of funds were spent, so it is not likely that all project deadlines will be met.¹³

Congressional oversight and monitoring was included in ARRA. Specifically, NTIA/BTOP must maintain a Web site and make detailed project descriptions available in a transparent manner. NTIA/BTOP is required to provide quarterly reports on the status of its funding program.¹⁴ In contrast, ARRA did not provide any mandates for transparency for the RUS/BIP and it shows; there is virtually no project status detail provided on its Web site. However, RUS/BIP also submits quarterly reports to Congress with summary application data.¹⁵

The Congressional Research Service (CRS) provides some oversight support to Congress and on April 19, 2011, published a status report (Kruger 2011). According to the report, “as of October 1, 2010, all BTOP and BIP awards were announced. In total, NTIA and RUS announced awards for 553 projects, constituting \$7.465 billion in federal funding. This included 233 BTOP projects (totaling \$3.936 billion) and 320 BIP projects (totaling \$3.529 billion).”

12.7 Efficacy of ARRA

It remains to be seen if ARRA broadband subsidies result in a substantial boost in short-term economic activity, especially considering that the money is being spent rather slowly and before any fundamental institutional reforms have been made to mitigate the aforementioned regulatory roadblocks. The CRS report states that the primary issue for Congress is “to ensure that the money is being spent wisely and will most effectively provide broadband service to areas of the nation that need it most, while at the same time, minimizing any unwarranted disruption to private

¹¹ For details, see <http://www2.ntia.doc.gov/>.

¹² For details, see http://www.rurdev.usda.gov/utp_bip.html.

¹³ Kruger (2011), p. 9.

¹⁴ See the latest quarterly report: “Broadband Technology Opportunities Program (BTOP) Quarterly Program Status Report,” submitted to the Committee on Appropriations United States Senate, the Committee on Appropriations United States House of Representatives, the Committee on Commerce, Science and Transportation United States Senate, and the Committee on Energy and Commerce United States House of Representatives, December 2011, National Telecommunications and Information Administration, US Department of Commerce.

¹⁵ See the last report available on the RUS/BIP Web site: “Broadband Initiatives Program Quarterly Program Status Report,” submitted to The Committee on Appropriations United States Senate and The Committee on Appropriations US House of Representatives December 27, 2010, US Department of Agriculture Rural Development Rural Utilities Service. See http://www.rurdev.usda.gov/supportdocuments/BIPQuarterlyReport_12-10.pdf.

sector broadband deployment.” The concern is that public subsidies not be used to replace or compete against market investments made by existing broadband network companies. There is some research supporting such a claim.¹⁶

Recognizing the concern, NTIA and RUS implemented a public notice response (PNR) procedure whereby existing companies have 30 days to inform the agency that a certain funding application includes an area already covered and therefore does not meet goals of the program. Needless to say, the majority of applications triggered a PNR from an incumbent operator, putting the agency in the position of making a judgment one way or another. This is a sticky wicket indeed, and there is no easy solution; the incentives on both sides of the issue are to maximize profit and/or subsidies, neither of which is consistent with the overriding public policy objective to provide consumers with broadband at the least cost of supply and the lowest price for usage. This has resulted in a struggle among major players to protect or promote their own turf; many jobs were created for bureaucrats to administer the subsidies and prevent fraud, and for lobbyists fighting over pots of taxpayer money.

Once the \$7 billion plus stimulus package and National Broadband Plan was announced, Web sites began popping up advocating the policy position of special interest groups. With names like “Save Rural Broadband” and “Broadband for America” it all sounds like “mom and apple pie.” Sometimes, it is not obvious exactly who founded any particular organization or who is funding it. Certain other Web sites represent organizations (e.g., LinkAmerica Alliance) that receive subsidies on behalf of public and public/private entities but proclaim their independence from any particular group. There is usually no identification of funding by any corporate sponsor(s) provided on the Web site. Such is the nature of lobbying, but one has to be wary of accepting policy analysis and recommendations from anonymous sources.

12.8 Measuring Success

The primary measures of success are jobs created and increased rural broadband subscriptions. But nowhere in ARRA progress reports submitted to Congress is there any serious attempt to quantify increased broadband subscriptions and associated jobs created. There is scant evidence of increased jobs or subscriptions that can be attributed to the stimulus program over that that would have occurred without the program. Analytically, this is not an easy task, but is nevertheless

¹⁶ For example, one recent study claims that “The evidence indicates that RUS’ history of funding duplicative service has continued under BIP, and that the current program is not a cost-effective means of achieving universal broadband availability.” See “Evaluating the Cost-Effectiveness of RUS Broadband Subsidies: Three Case Studies,” Jeffrey A. Eisenach, George Mason University School of Law, Kevin W. Caves, Navigant Economics, April 13, 2011. It should be noted that the cable industry lobby (NCTA) supported this study.

Table 12.1 BTOP awards by grantee entity type

Entity type	Number of awards	Total awards (%)
Government	89	38
Nonprofit	58	25
For-profit	55	24
Higher education	25	11
Tribe	6	2
Total	233	100

Source Department of Commerce, NTIA

essential, as noted in the CRS report: “Evaluating the overall performance and impact of broadband programs is complex. Not only must the validity of the agency estimates be assessed; it is also necessary to take into account broadband deployment that might have occurred without federal funding.”

NTIA and RUS released early estimates of increased broadband subscriptions after the awards were announced.¹⁷ Without presenting any detailed analysis, RUS/BIP forecasts increased subscriptions of 2.8 million households and 364,000 businesses and 25,000 immediate jobs created. NTIA/BTOP estimated *potential*-increased subscriptions at 40 million residential and 4.2 million for small business. In future, policymakers need to seek out independent objective sources for rigorous analysis.¹⁸

Suffice it to say that unless and until the aforementioned institutional linchpins to success are mitigated, there is relatively little more that government deficit spending can accomplish. While the money may eventually get spent, it is doubtful that it will significantly increase rural broadband subscriptions over what they would have been anyway.

Increased broadband subscriptions cannot occur until construction of physical connections linking a subscriber premise to the core network. Therefore, if the government’s objective were focused on private sector job creation, the biggest immediate positive impact on the economy would be projects that directly expand connections to small businesses.

Most of the BTOP awards went to government entities and nonprofits, and most of the funds went to “middle-mile” projects, not “last-mile” subscriber connections (Table 12.1).¹⁹

¹⁷ The Broadband Technology Opportunities Program: Expanding Broadband Access and Adoption in Communities Across America, Overview of Grant Awards, p. 19, NTIA/BTOP, December 14, 2010. Advancing Broadband: A Foundation for Strong Rural Communities, p. 3–4, USDA/BIP, January 2011.

¹⁸ For example, Katz provides references to academic studies including a summary of studies relating broadband investment to employment and economic growth, p. 2, Fig. 1, Studies of the Employment Impact of Broadband, in: “Estimating Broadband Demand And Its Economic Impact In Latin America,” Prof. Raul L. Katz, Columbia Business School, Proceedings of the 3rd ACORN-REDECOM Conference Mexico City, May 22–23rd 2009.

¹⁹ Tables reproduced from CRS Report (2011).

On the other hand, two-thirds of BIP grants and loans went to for-profit entities and another 22 % went to rural cooperatives (Table 12.2).

This is no surprise since RUS grants and loans have traditionally been targeted to incumbent rural telephone companies or their contractors. This itself is another institutional arrangement that is troubling. Historically, RUS refused to make loans or grants to any applicant that planned to invest in facilities within an incumbent's local exchange territory, especially if the incumbent was a past recipient of RUS funds. This policy is blatantly anticompetitive, but was viewed as necessary since small rural telcos already were being subsidized for their existence.

Almost 75 % of the BTOP projects were for deployment of wireline (fiber-optic) technology and only about 8 % for wireless. For BIP projects, about 72 % were for wireline investments and 17 % for wireless. It is impossible to know how spectrum policy reform might have boosted the wireless portion of the investment, but it surely would be substantial if cheap or even free small market licenses and/or spectrum sharing were available.

Most digital network upgrades to traditional rural telco networks also serve to make them broadband capable; indeed since 1994 RUS required that funds granted to telcos be used to construct "broadband capable" networks, and in 2002, the RUS initiated the Rural Broadband Access Loan and Loan Guarantee Program. While the RUS/BIP no longer has a policy of denying applications for entities that wish to enter an incumbent's service territory, it does require that the territory the new entrant wishes to enter is unserved or "underserved." Whether the effect of these anticompetitive policies produce a net benefit to rural consumers remains an unanswered question. After all, if the government were not convinced that monopoly was the right business model for rural telecom, it would not have passed the rural waiver portion of the 1996 Act that mandated competition for most telcos. There can be no doubt that the RUS bias toward its incumbent telco clients, coupled with the federal rural competition waiver, not to mention the FCC uni-

Table 12.2 BIP infrastructure awards by entity type

Number of entity type	Awards	Total grant (\$millions)	Total loan (\$millions)	Total award (\$millions)
For-profit corporation	202	1183	544	1727
Cooperative or mutual	65	740	486	1226
Public entity	13	209	123	332
Nonprofit corporation	8	67	20	87
Indian tribe	9	34	17	51
Total	297	2233	1191	3425

Source US Department of Agriculture, Rural Utilities Service, December 27, 2010, RUS Quarterly ARRA Report, p. 5, available at http://www.rurdev.usda.gov/supportdocuments/BIPQuarterlyReport_12-10.pdf

versal service subsidies, constitutes a formidable barrier to entry for competitive broadband companies wishing to enter rural markets.²⁰

12.9 Wyoming: A Policy Case Study

Since supply and demand conditions vary greatly from state to state, a meaningful economic analysis of broadband policies requires a localized view. Having researched universal service issues for over 30 years and having lived in Wyoming for 20 years, this author is somewhat uniquely qualified to address issues regarding universal rural broadband in Wyoming.²¹

Of all the states in the lower 48, Wyoming is arguably the best case for evaluating the efficacy of universal broadband policies. Wyoming has the highest cost and highest prices for basic phone service and it is the least populous state with the lowest population density per square mile. Wyoming's land mass features a challenging mountainous topography, and it has the least rural broadband availability.²²

12.10 Institutional Considerations

Wyoming, like all states, must contend with all of the aforementioned federal roadblocks as it tries to achieve universal broadband coverage. In addition, Wyoming has its own unique institutional roadblocks that are a combination of legacy statutes, regulations, and industry structure. Fortunately, the goals and

²⁰ For example, the CRS Report states "Until 2011, the USDA Office of Inspector General (OIG) had not reviewed the BIP program, instead leaving that review to the Government Accountability Office (GAO). OIG has previously reviewed (in 2005 and 2009) the existing RUS Rural Broadband Access Loan and Loan Guarantee Program and made a number of criticisms, primarily that too many loans were made in areas with preexisting broadband service and in areas that were not sufficiently rural."

²¹ Author was a member of the governor's Wyoming Telecommunications Council (2003–2007); the Council objective was to implement a statewide universal broadband access policy. Past research includes "Toward a Sound Public Policy for Public High-Speed Information Networks," Columbia Institute for Tele-Information, Research Working Paper #282, Columbia Business School, September 1988; "Bringing Advanced Telecommunications to Rural America: The Cost of Technology Adoption," Columbia Institute for Tele-Information, Research Working Paper #393, Columbia Business School, October, 1990 and *Telecommunications Policy*, February, 1992; "The Case for Residential Broadband Communication Networks," draft, Columbia Institute for Tele-Information, Research Working Paper #456, Columbia Business School, January 1991; "Improving Rural Telecommunications Infrastructure," The Center For Rural Studies, Nashville, TN (1995) and TVA Rural Studies, University of Kentucky.

²² Wyoming has 67.3 % of rural population without broadband access versus 28.2 % for the US. See FCC report (2011a), Appendix B, p. 25.

solutions at the state level are the same as at the federal level, namely increase investment and reduce demand prices for broadband access.

Just as at the federal level, Wyoming lacks the leadership and statesmanship required in order to reform outdated institutions and rules. There is no significant activity within state government to direct broadband investment policy.²³ Realizing the important contribution that broadband makes to economic growth and productivity, many other states have designated a responsible agency (and budget) to design policies to promote it.

Wyoming state government has a particularly troubling institutional arrangement. By statute, the Wyoming Public Service Commission (PSC) is charged with responsibility for championing universal telephone service and is proscribed from regulating broadband. The result is that PSC policies favor small rural telcos, sometimes at the expense of good broadband policy. In short, the supply and demand for traditional telephone regulation are alive and well in Wyoming. If and when telephone subscribers in rural Wyoming bypass the phone network and begin making phone calls over broadband connections, the PSC will have nothing to regulate.²⁴ Indeed, the PSC has already filed comments with the FCC requesting that it reconsider those portions of its plan to reduce or eliminate usage-based interconnection charges and redirect USF toward broadband and away from POTS.

The PSC views the FCC's plan to promote universal broadband as a threat to small rural telcos: "We have no quarrel with the FCC's general vision for a broadband future, but our practical experience is that this vision falls short of the universal service required by federal statute."²⁵ In particular, the PSC is opposed to the FCC's plan to dramatically reduce per-minute charges paid by long-distance companies to small rural telcos, and, in turn, prices for long-distance calls. Given the current institutional arrangements that exist, the PSC has a point. The PSC approves and administers the (high) state tariff for interconnection and is simply doing its job to protect it, especially since it has no statutory mandate to promote universal broadband. But the bigger issue is what is right for the future. Besides slowing down broadband investment, it is absolutely clear that the old way of generating rural subsidies from usage-based charges is inefficient, anticompetitive,

²³ There is some state government activity to direct federal subsidy funds for rural health care, libraries, and education, but these are administered on a case-by-case basis by responsible agencies. The chief information officer (CIO) has responsibility for operations and procurement of state government telecom systems, but has no statutory authority for broadband policy development. The CIO also has responsibility for meeting data production requirements of the National Broadband Plan and has hired an outside consultant to do so.

²⁴ Except for electricity, gas, and water.

²⁵ Further Inquiry into Certain Issues In the Universal Service-Inter-carrier Compensation Transformation Proceeding, Reply Comments of The Wyoming Public Service Commission, September 6, 2011, p. 4. The full document is available at: <https://prodnet.www.neca.org/publicationsdocs/wwpdf/9711wypsc.pdf>.

and a huge welfare loss for consumers.²⁶ Consumer welfare is highest when call charges are lowest and any policy that promotes low prices for calling is a good policy.

Wyoming state government needs to reform its institutions so that incentives for all agencies are aligned to promote broadband. It can be done without necessarily harming small telcos by implementing an efficient system for recovering so-called stranded investment, created when subscribers switch from expensive phone calls over POTS to cheap or even free calls over the internet.²⁷

The writing is on the wall; Wyoming already has many more cell phones than telephone lines and it will just as surely be the same in the future for broadband lines. Government needs to embrace the transition to telephone alternatives, not delay it. Wyoming law needs to be changed. Either the PSC needs to be allowed to enact policies to actively promote broadband, as the FCC is allowed to do, or a new agency needs to take on the task.

The office of the Governor does have a policy advisor for Energy and Telecommunications, but the lucrative energy segment garners the attention while telecommunication gets short shrift. Wyoming, with no state income tax, enjoys annual state budget surpluses due to its huge energy sector revenues. Significant progress toward universal broadband is achievable if only a small fraction of the annual energy sector surplus were redirected to investment in broadband. Yet, for lack of leadership, the proposition is not even being considered. Broadband needs and deserves its own champion in state government.

Another institutional problem that needs to be overcome is the ownership, operation, and administration of state telecom network infrastructure. Historically, and for good reason, economic development in large but sparsely populated western states relied on transportation infrastructure and electrification. These two are related since public rights-of-way for utilities usually follow road and rail transport routes. As a result, the Wyoming Department of Transportation (WYDOT) was granted ownership and control of state rights-of-way and public telecom network infrastructure. As a practical matter, WYDOT road projects dominate its budget and resources; telecom is merely an afterthought. Transportation infrastructure projects must comply with a regimented bureaucratic process and timeline that is not consistent with relatively rapid and flexible deployment that is typical for broadband technology. WYDOT planning for upgrades to roads and bridges is based on a 5–20+-year time horizon. Telecom network technology planning and deployment, especially wireless, occurs on a much shorter time

²⁶ For example, see the numerous references to past studies in Elleg, Jerry, "Intercarrier Compensation and Consumer Welfare," *Journal of Law Technology and Policy*, Vol. 2005, No. 1. Welfare losses due to Universal Service subsidies derived from usage-based charges are discussed in pp. 118–123.

²⁷ This is nothing new; such policy practices have been in place for years in many jurisdictions.

horizon and at much less cost.²⁸ Thus, to the extent that WYDOT has to “sign off” on a given broadband infrastructure project, the result is an unacceptably slow process or, more likely, no deployment at all.

To this day, almost all of Wyoming’s vast territory has no cell service available. Outside of city limits (and there are not many cities), there is limited cell phone coverage, even along the interstate highways. Yet, tourism is a major industry, and this lack of wireless service can be frustrating for travelers that possess laptops or other mobile devices. Years ago, the governor’s Wyoming Telecom Council suggested equipping highway rest stops with Wi-Fi so travelers could use their laptop computers or other mobile devices. At the time, even most Wyoming airports did not have Wi-Fi.

WYDOT approval was required. WYDOT officials said that they might consider such a project if they could work it into its *7-year plan*. Given this institutional dynamic, no broadband investment proposal—regardless of its merits—would get past the discussion stage.

In summary, Wyoming needs to place control over state telecom assets and infrastructure in a separate agency.

12.11 Telecom Law, Prices, and Public Welfare

In 2007, the state legislature revised the 1995 Telecommunications Act.²⁹ This was a substantial revision of rules governing competition in the industry, but it did not achieve any significant progress on the broadband front. The result of the 1995 Act and the 2007 Act (revising the 1995 law) was deregulation of services and substantial increases in monthly tariffs for basic phone service coupled with decreases in tariffs for toll calls and interconnection.³⁰ The bill was basically a negotiated industry compromise between small and large telcos and did little to promote significant infrastructure investment.

The best way to gauge the public benefit of any given universal service policy is economic welfare. Technically, economic welfare is the sum of consumer surplus and producer surplus. Consumer surplus is high when prices are low, and producer surplus is high when supply prices (costs) are low. Thus, policies that promote public welfare should result in low prices for both suppliers and consumers. Usually, the forces of competition serve to drive down costs and prices, but not in the case of universal service; government policy must be relied on to minimize the level of subsidies required to achieve low (so-called affordable) prices. The system

²⁸ Indeed, during my tenure as a government advisor during the legislative budget session, it became immediately obvious that a reallocation of a small amount of road improvement funds *in a single year* could go a long way toward funding a long-lived rural broadband infrastructure.

²⁹ For a summary of legislation, see the 2010 Annual Telecommunications Report, Wyoming PSC at: <http://psc.state.wy.us/htdocs/telco/telco10/2010%20Annual%20Telecom%20Report.pdf>.

³⁰ *ibid.* Table 7, p. 14, provides a summary of tariff increases from 1995 to 2009.

of subsidies and prices in Wyoming, and throughout rural America, is a good (bad) example of how *not* to achieve a high level of economic welfare.

To illustrate the point, Wyoming's prices for basic phone service are far above the national average, even for the largest phone company in the state and even after accounting for USF subsidies.³¹ Rural consumer prices for basic telephone service in Wyoming range from about \$18/mo to \$80/mo.³² Table 12.3 provides average monthly telephone prices and subsidies for Wyoming rural consumers for the largest phone company, CenturyLink (formerly Qwest).³³

CenturyLink serves more rural consumers than any other telco in Wyoming and even after USF credits of \$34.25/mo are applied, the consumer pays \$49.50/mo. This far exceeds what the average consumer in the US pays, prompting the Wyoming PSC to engage in a lengthy litigation to remedy what it views as a violation of Section 254 of the 1996 Act.³⁴

Besides the obvious problem that there are numerous confusing line items that appear on customer bills, examination of the data in Table 3 reveals why current policy is bad for economic welfare. The source of funds for the federal subsidy of \$28.70/mo includes usage-based charges for interconnection called "carrier access charges" and "intercarrier compensation charges" (ICC). As mentioned previously, this is an inefficient and unsustainable way to generate subsidies.

A preferred way to generate a subsidy is a revenue surcharge. Indeed, the Wyoming PSC itself instituted a state universal service subsidy (\$5.55/mo) generated via a revenue surcharge on all retail telecom revenue in Wyoming.³⁵ Yet, the Wyoming PSC saw fit to petition the FCC to reconsider its plan to phase out usage-based charges to generate USF funds. This is a case of regulatory schizophrenia and a spectacular example of regulatory hypocrisy.

The most effective way for consumers to avoid paying Wyoming's high prices for basic phone service is to obtain a broadband connection. By far, the biggest immediate benefit to households and businesses with a broadband connection is VoIP. For a nominal flat fee, VoIP lets consumers make unlimited phone calls, even long-distance calls, to any other phone for no charge and even international calls for a penny or two a minute. Consumers that have a computer with a microphone can make VoIP calls to any other similarly equipped computer for free

³¹ *ibid.*

³² *ibid.* Table 7, p. 14.

³³ *Source* notice of inquiry regarding issues raised by the February 23, United States Court of Appeals for the Circuit Qwest II Decision, Comments of the Wyoming Public Service Commission, May 8, 2009, Table 12.1, p. 11.

³⁴ 47 U.S.C. §254 calls for a federal USF that is sufficient to provide rate comparability between rural and urban areas. For details on the federal court proceedings, ref. fn. 25, p. 8, Federal Universal Service Issues.

³⁵ The Wyoming PSC requires all telecom providers to pay 1.2 % of annual retail revenue into the state USF. See Order Establishing The Wyoming Universal Service Fund Assessment Level, May 13, 2011, <http://psc.state.wy.us/htdocs/wyusf/wusf-assessment2011.pdf>.

Table 12.3 Wyoming rural residential price for basic service

Basic residential access line rate	\$69.35
Federal universal service fund credit	(\$28.70)
Wyoming universal service fund credit	(\$5.55)
Net residential rate subject to mandatory surcharges and taxes	\$35.10
Federal subscriber line charge	\$6.50
Federal universal service fund surcharge	\$3.51
Wyoming universal service fund surcharge	\$0.69
Telecommunications relay system surcharge	\$0.06
Wyoming lifeline program surcharge	\$0.15
E911 emergency calling system tax	\$0.75
Federal excise tax	\$1.05
Wyoming state sales tax	\$1.68
Total basic residential service rate to customer	\$49.50

and, if equipped with a camera, video calls are also cheap or free.³⁶ If you have a broadband connection but do not want to involve your computer to make calls, you can use cheap alternatives like “Magic Jack Plus” that provides unlimited free local and long-distance phone calls using your existing phone set and your old phone number.

While surfing the Web at broadband speeds is a great benefit to any household, getting monthly phone service for almost no charge is an obvious bonanza for the average consumer. In large swaths of Wyoming where affordable broadband is not available, consumers are denied the benefits of VoIP that their more urban counterparts routinely enjoy. Essentially, this is akin to a tax on where you happen to live. In many rural areas of Wyoming, telco customers pay high per-minute prices for long-distance calls. Similarly, if a telco customer tries to switch to a discount long-distance provider, they will have to pay high interconnection fees or “access charges.” The high charges are permitted because of rural waivers that exempt rural telcos from the low tariffs imposed on larger telcos.

Since VoIP customers can reduce and even eliminate their existing monthly phone charges, telcos are financially harmed. Incumbent telcos fight back in order to retain their subsidies and stay profitable.

For example, if a rural telco basic service subscriber asks to have their phone number reassigned to a competitive long-distance company (some of which use VoIP), it can refuse to do it.³⁷ Larger carriers, like CenturyLink, cannot refuse to do so because they do not enjoy a rural waiver from federal requirements forcing

³⁶ For example, Skype phone service allows for free domestic phone calls for a small (\$50) annual fee and nearly free international calls. Also, Facebook is ubiquitous and free and allows calling anyone that is online, including video calls using Skype.

³⁷ Small rural telcos do offer subscribers that wish to keep their phone number a choice of PSC-approved companies to designate as their primary long-distance provider, but they must pay for the privilege via relatively high interconnection charges.

low interconnection fees and local number “portability.”³⁸ Many consumers who want to switch to a discount long-distance service do not want to change their old phone number and this is often a deal breaker. Consumers are not familiar with the law and do not know who to complain to when a request to transfer their phone number is denied.

In its traditional service territory, small rural telcos do not face any competitive threat from cable TV companies offering broadband via a cable modem. Even if it did, due to rural waivers and regulatory loopholes, there may not be any enforceable statute requiring small telcos to accommodate competitors with reasonable interconnection terms or prices.

Silver Star Communications, a small telco based in Star Valley Wyoming, provides a good anecdote of how a small rural telco can exercise some leverage from exchanges where it enjoys a basic service monopoly. Silver Star is known as a rather progressive local telco that has aggressively pursued expansion into nearby telco service areas, especially CenturyLink. Larger telcos, like CenturyLink, cannot take advantage of federal grants and loans, rural waivers or other regulatory loopholes.

In Alpine Wyoming, with no cable competitor, Silver Star charges its basic service subscribers \$46/mo for local calling and \$0.105/min for long distance.³⁹ Contrast this with the situation only 30 miles up the road in the lucrative and wealthy enclave of Jackson Hole, served by CenturyLink. CenturyLink’s customers easily avail themselves of competitive discount long-distance carriers using VoIP or they can cancel phone service and switch to cable modem service and still keep their old phone number. For example, cable provider Optimum offers relatively low-priced broadband service, including the option of phone service featuring unlimited local and long-distance calls for only \$15/mo. Of course, once a broadband connection is purchased, there are other “unbundled” VoIP alternatives costing even less.

Primarily funded by government subsidies, Silver Star is constructing a fiber-optic broadband network in Jackson Hole, allowing CenturyLink’s customers to obtain their phone service using Silver Star’s cheaper VoIP service. This story is but one example of business strategies that small rural carriers use to exploit subsidies. It highlights the widespread price discrimination that exists in Wyoming and the need for reform to level the playing field.

Silver Star’s strategy is a good one and it would be wrong to suggest that it is engaging in anticompetitive behavior, it has operated within certain regulatory parameters for decades, and it continues to provide high-quality (albeit subsidized)

³⁸ Technically, small rural telcos are supposed to comply with federal regulations mandating number portability, but, as a practical matter, some do not.

³⁹ Like Qwest’s basic service tariff in Table 12.3, Silver Star’s nominal tariff rate for local service in Alpine Wyoming is only \$26.45/mo., but is nearly double that after all the add-ons from regulatory fees and taxes. The \$0.105/min. price is the stand-alone tariff rate, and the rate drops down to \$0.055/min. with a “bundled” service package. Silver Star also offers its own broadband service for between \$40 and \$100/mo. (depending on speed).

service. No small rural telco can be faulted for acting in its own best interest in pursuit of maximum profit within the institutional environment imposed on it.

The solution is to promote competitive broadband solutions like VoIP everywhere in the state without sacrificing universal service for POTS. The federal government's broadband initiative and CAF plan are designed to shift current POTS subsidies into favoring broadband. This should eventually allow every rural household in America to save money with VoIP.

Wyoming state government needs to get on the "broad-bandwagon" and start reforming its antiquated and highly discriminatory policies. Indeed Wyoming may be the only state in America that still maintains a state subsidy for local phone companies. It will not be easy for lawmakers to reform the system because incumbent local telcos will be suspicious that the result will be financially devastating despite promises to the contrary, but the process must begin because it is the right thing to do for citizens of Wyoming.

12.12 Supply-Side Analysis

There are very few rigorous cost studies for rural broadband. The primary reason is that it is difficult to gather reliable data at a sufficiently granular level to yield meaningful results. Fortunately, Wyoming state government commissioned such a study, completed in 2006 by Costquest.⁴⁰

A rigorous analysis relies on geographic and topographic data for households and businesses. This type of "bottom-up" study has previously been employed by the FCC to administer its USF high-cost fund. These type studies invariably demonstrate that there is no such thing as a representative "average" household or average cost per broadband connection. Every household, or enclave of similarly situated households, especially in remote areas, features a unique combination of geography, topography, and the nearest existing network infrastructure. Based on the specific location and circumstances, the cost to construct a physical broadband connection is calculated and summed across all locations to arrive at a total cost. On top of that, on-going operating expenses must be factored in to arrive at a reliable estimate of total annual costs to provide service. This type of cost modeling is extremely data intensive, but is nevertheless the proper approach.

The Wyoming broadband cost study results reflect the "augmentation" investment required to build or otherwise upgrade an existing network connection to provide broadband access. Both wired and wireless technologies were

⁴⁰ "Costs and Benefits of Universal Broadband Access in Wyoming," October 24, 2006, Costquest Associates. Study documentation is available at: <http://www.costquest.com/uploads/pdf/CostsAndBenefitsofUniversalBroadbandAccessInWyoming.pdf>. A follow-on case study on the cost of wireless broadband: "Targeting Wireless Internet Services at Areas with Lower Investment Thresholds" is available at: http://www.wyoming.gov/loc/04222011_1/Documents/Statewide_IT/Broadband%20Information/Wireless_BB.pdf, Costquest, 2006

Table 12.4 Estimated augmentation investment by technology

Technology type	Per customer mean up front capital cost (\$)	Per customer median up front capital cost (\$)
Cable	18,932	8,533
Telco	4,570	1,115
Wireless	1,324	1,243

considered for each household located in rural areas without broadband access. The cost model was designed to select the technology solution based on least cost. The study showed that about 20 % of Wyoming households were located in areas with no broadband access; 90 % of those could be served by wireless access technology, and it was often the least cost solution. The results are summarized in Table 12.4.⁴¹

Both the mean and median per household costs are provided to show how high-cost locations skew the average result. The relatively few high-cost locations pull the average cost up.

Another bottom-up study by National Exchange Carrier Association (NECA) employs data based on a representative sample of rural telco lines and engineering parameters to arrive at a broad average cost per broadband connection, as if an existing rural telephone line was already in place and needed to be upgraded to handle broadband service.⁴² The results of the study yield an average cost of \$3,270/line, and the range is \$493/line for relatively short lines (<18 kft) up to \$9,328/line for long lines.

Even though it is possible to get good objective estimates of the lowest cost to provide broadband access to rural households and businesses, the result is a seemingly endless battle among special interests that stand to lose or gain financially. Ultimately, it always boils down to a question of who gets the subsidy to provide broadband service and every major player hires lawyers, consultants, and lobbyists to either skew the results in their favor or attack the industry segment that happens to employ the lowest cost technology solution.

As always, once an objective accurate cost estimate is produced, it will take courage and statesmanship on behalf of regulators to take the political heat and target the subsidy precisely to minimize the cost to taxpayers. One method regulators can employ to sort out the least cost solution for any given area is to auction off the rights to serve all subscriber locations in that area, including a commitment to a date certain for completion of network construction. The low bidder would be granted a subsidy equal to their bid, or second lowest bid, and regulators would oversee the process.⁴³ As before with the stimulus package, the

⁴¹ *ibid.* p. 26. Even though the cost model included satellite as an alternative wireless technology, it is not included here because it is not capable of providing high-quality VoIP.

⁴² “NECA Rural Broadband Cost Study: Summary of Results,” June, 2000. Available at http://www.ics.uci.edu/~sjordan/courses/ics11/case_studies/NECA%20rural%20bb.pdf.

⁴³ See Alleman et al. (2010) and the reference cited therein.

success of this process would be much greater, and the cost to taxpayers much lower, if the government would first reform rural spectrum policy and force (or bribe) national network operators to offer connections to the core network at low (or zero) tariff rates for interconnection to the internet. One of the largest, if not the largest, operating cost for local broadband companies is for network interconnection, and this is a regulatory challenge that must be overcome. Broadband access connections are not good if core network companies do not offer physical interconnection points at low prices.

12.12.1 Federal Stimulus Funds: A Missed Opportunity

It is clear that the state of Wyoming requires the most subsidy per capita to achieve universal rural broadband, so it makes sense that federal stimulus funds targeting rural broadband should end up in Wyoming. One obvious disadvantage of not having a broadband advocate in state government is missing out on federal government grants to promote rural broadband. For example, of the over \$7B in stimulus funds available for broadband infrastructure projects, none was awarded to Wyoming-based public or public/private entities. Surely, had there been a broadband champion in state government to drum up projects, more federal funds would have been requested and awarded for Wyoming entities. Of the over \$3B of RUS/BIP money doled out, none was for a Wyoming applicant.⁴⁴

Of the over \$4B NTIA/BTOP money, only a small award of some \$4M was made to a Washington State nonprofit consortium run by Ohio-based Costquest that filed grant applications on behalf of the Wyoming Office of the CIO. It turns out that Costquest, the consultant/contractor that performed the Wyoming broadband cost study, and the primary beneficiary of the BTOP funds, was the force behind the application.⁴⁵ A careful review of this grant reveals that it is not unique for Wyoming. In fact, grants of similar size for the same purpose were made to all 50 states, Samoa, Guam, and the US Virgin Islands, in order satisfy data requirements associated with NTIA's State Broadband Initiative and the Broadband Data Improvement Act. The only thing unique to Wyoming is that it is one of the few states that chose to hire an out-of-state private entity to apply for the funds and do the work. Had there been a state employee responsible for broadband, this BTOP grant would likely have created more jobs in Wyoming. There should

⁴⁴ A list of BIP awards by state is in the report to Congress at: http://www.rurdev.usda.gov/supportdocuments/BIPQuarterlyReport_12-10.pdf.

⁴⁵ For detailed information of the NTIA/BTOP grant, see "Wyoming Broadband Data and Development Grant Program, LinkAMERICA/Puget Sound Center for Teaching, Learning and Technology Designated entity on behalf of the State of Wyoming." See http://www.ntia.doc.gov/legacy/broadbandgrants/BroadbandMapping_Wyoming_091130.pdf. BTOP funds were also used to develop a Web site that tracks project activity. See <http://www.linkwyoming.org/lwy/Default.aspx>.

have been many more applications dedicated to Wyoming-specific projects employing Wyoming residents.

A portion of this BTOP grant allowed Wyoming's chief information officer to hire Costquest to conduct a survey of broadband network infrastructure and vendors. Interestingly, the report concludes that state government leadership is lacking and needs to be established to maximize the likelihood of universal affordable broadband.⁴⁶

A more substantial, but still smallish, amount was awarded to a Wyoming telco, Silver Star, for construction of a fiber-optic trunk line to boost internet speeds and extend high-speed broadband service to five Wyoming counties and to attract new broadband customers, mostly in CenturyLink's service territory in and around the lucrative and wealthy enclave of Jackson Hole. It is worth noting that no other Wyoming telco applied for stimulus funds, including CenturyLink. This lack of Wyoming rural telco applications for federal money to build broadband infrastructure is puzzling, but it is likely that Silver Star is taking advantage of a subsidy that will provide a competitive advantage that should pay off handsomely.

12.13 Conclusions

Reflecting on the Wyoming experience, even though Wyoming represents a unique challenge for universal rural broadband access, it is illustrative of the problems confronting all states with a significant rural population. It is clear that significant reforms to current regulations are the linchpin for overcoming problems and implementing effective solutions, and that, in turn, requires new leadership and statesmanship from federal and state policymakers.

The primary reason that current government policy is failing to achieve universal rural broadband is rooted in its own past statutory and regulatory policy. The two biggest roadblocks are the rural waiver provided for in the 1996 Act and the disastrous policy for (mis)allocating radio spectrum. Unless and until substantial reform or repeal of these policies occurs, the achievement of universal (affordable) rural broadband will be elusive. The most recent government initiatives, including massive "stimulus" spending, will not result in a marked difference over what could be achieved without it; what begins as a perfectly reasonable proposition for stimulating rural broadband, ends up being a struggle among entrenched special interests over pots of taxpayer money. The result is that a small amount of network infrastructure investment and construction jobs will be added, but the industry segments with the most growth will be lobbyists and bureaucrats.

⁴⁶ "Report of Findings: Wyoming Broadband Interviews," LinkWyoming, July 2010, p. 20 concludes "Strong leadership is needed to build awareness about the benefits of broadband in Wyoming. An advocacy effort is needed to improve fixed and mobile broadband access in Wyoming." The full report is available at: <http://www.linkwyoming.org/lwy/docs/WYReport8July2010.pdf>.

Fixing the problem is straightforward: Eliminate entry barriers from rural waivers, reduce tariffs for network interconnection, target direct subsidies in a technologically neutral fashion, and reform spectrum regulations.

References

- Alleman J, Rappoport P, Banerjee A (2010) Universal service: a new definition? *Telecommun Policy* 34(1–2):86–91 (ISSN 0308-5961), (Feb–Mar)
- American Recovery and Reinvestment Act (ARRA) of 2009 (Public Law No. 111-5)
- Congressional Research Service (2002) Telephone bills: charges on local telephone bills, 12 June 2002
- Dickes LA, David Lamie R, Whitacre BE (2010) The struggle for broadband in rural America. Choices, a publication of the Agricultural & Applied Economics Association, 4th Qtr.
- Federal Communications Commission (FCC) (2011a) Bringing broadband to rural America: update to report on a rural broadband strategy. 17 June 2011, GN Docket No. 11-16
- Federal Communications Commission (2011b) FCC 11-83, Declaratory Ruling, WC Docket No. 10-143, GN Docket No. 09-51, CC Docket No. 01-92, Adopted: 25 May 2011 Released: 26 May 2011
- Federal Communications Commission (2002) FCC spectrum policy task force report. ET Docket No. 02-135, Nov 2002
- Federal Communications Commission (2010) Connecting America: the national broadband plan. Available at <http://www.broadband.gov/plan/>, 17 Mar 2010
- International Telecommunication Union (ITU) (2011) Broadband: a platform for progress, a report by the broadband commission for digital development, June 2011
- Kruger LG (2011) Background and Issues for Congressional Oversight of ARRA Broadband Awards. Congressional Research Service, 19 Apr 2011
- The Telecommunications Act of 1996 (1996) P.L. No. 104-104, 110 Stat. 56