



Bringing Broadband to Rural America

Report on a Rural Broadband Strategy

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Acting Chairman
Federal Communications Commission
May 22, 2009





**FEDERAL COMMUNICATIONS COMMISSION
ACTING CHAIRMAN MICHAEL J. COPPS**

BRINGING BROADBAND TO RURAL AMERICA: REPORT ON A RURAL BROADBAND STRATEGY

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I. INTRODUCTION

1. For many Americans, a world without broadband is unimaginable. For them, broadband Internet access has transformed the way they live their lives. But we have not succeeded in bringing broadband to everyone. For years, large parts of rural America have languished on the sidelines of the digital revolution. Home to the homesteaders, pioneers, and the rich and diverse Native American cultures that contribute so much to our national identity, rural America has for most of our history been deemed too remote, too sparsely populated, or too inaccessible to be fully connected with our nation's infrastructures.

2. As many of their fellow citizens in more densely populated parts of the country go online for work, education, entertainment, healthcare, civic participation, and much more, too many rural Americans are being left behind. Rural governments and businesses are missing opportunities to function more efficiently and effectively. Even in rural areas where broadband is available, infrastructure deployment has not kept pace with the growing need for faster and more reliable connectivity. At a time when access to affordable, robust broadband services is a fundamental part of efforts to restore America's economic well-being in both rural and urban areas, we must ensure that this capability is available to open the doors of opportunity for everyone.

3. In the 2008 Farm Bill, Congress recognized that the need for broadband in rural areas was becoming ever more critical.¹ That law requires the Chairman of the Federal Communications Commission (Commission), in coordination with the Secretary of the U.S. Department of Agriculture (USDA), to submit "a report describing a comprehensive rural broadband strategy" to Congress. Under the statute, this strategy must include, among other matters, recommendations for improving interagency coordination of broadband policies and initiatives; for assessing broadband needs in rural areas; and for how specific federal agency programs and resources can overcome the obstacles that currently impede rural broadband deployment.² In this Report, I discharge this Congressional mandate.

4. Upon becoming Acting Chairman in January 2009, I directed the Commission staff to begin developing the data and analysis to the extent possible to complete a Report in the limited time remaining.³ In some respects, events overtook this effort as Congress provided new direction and support for federal broadband policies and initiatives, guidance which frankly has reshaped our approach to the development of this Report. In particular, in the recently passed American Recovery and Reinvestment Act of 2009,⁴ also known as the stimulus package, Congress appropriated \$7.2 billion for broadband grants, loans, and loan guarantees to be administered by the USDA's Rural Utilities Service (RUS) and the Department of Commerce's National Telecommunications and Information Administration (NTIA).⁵ Congress recognized that this funding initiative, though substantial, was still just a down payment on the

¹ Food, Conservation, and Energy Act of 2008, Pub. L. No. 110-246, § 6112, 122 Stat. 923, 1966 (2008) (2008 Farm Bill).

² 2008 Farm Bill § 6112; *see infra* Part III.D (Recent Legislative Developments).

³ For the purposes of the preparation of this Report, staff opened a special docket (GN Docket No. 09-29) and solicited comments from the public. *See Comment Date Established for Report on Rural Broadband Strategy*, GN Docket No. 09-29, Public Notice, 24 FCC Rcd 2987 (2009). *See* Appendix A for a list of commenters. Though the Report uses "I" and "we" interchangeably, the comments, suggestions, and recommendations contained in this Report reflect the views of Acting Chairman Michael J. Copps, and not of the Federal Communications Commission.

⁴ American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009) (Recovery Act). The Recovery Act was signed into law on February 17, 2009.

⁵ Recovery Act, Division A, Title II, National Telecommunications and Information Administration (NTIA Appropriations); Recovery Act, Division A, Title I, Rural Utilities Service (RUS Appropriations).

broadband needs of the country, and that even after this money has been invested, many Americans, including those residing in rural areas, will continue to lack access to critical broadband services. Therefore, the Recovery Act charges this Commission with developing a national broadband plan by next February to ensure that every American has access to broadband capability and establishing clear milestones for reaching this goal.⁶

5. Shortly after President Obama took office, his administration began to play an important leadership role in the effort to expand broadband penetration throughout the nation. Through an interagency working group under the auspices of the National Economic Council, the Administration has brought together representatives from a broad cross-section of federal agencies, including the Commission, to coordinate implementation of the nation's broadband agenda. This working group provides an unprecedented forum for expert staff from different federal agencies to meet, discuss, and harmonize various federal broadband programs and policies, and identify areas for early action. I view these efforts, and other efforts on the part of the administration and Congress, as essential and vital components for the development of a rural broadband strategy.

6. Working together across the federal government and building on the interagency working group's efforts, we view the separate mandates from Congress as an unparalleled opportunity to ensure that the promise of universal access to broadband services is realized for all Americans. Making the most of this opportunity will require coordination of the various responsibilities with which this Commission is charged, as well as coordination among the federal agencies and other stakeholders with roles in achieving the nation's broadband goals. We must ensure that this Report and the national broadband plan, to be delivered to Congress by February 17, 2010, are not isolated outputs. Rather, we must view these initiatives, along with the Commission's other broadband responsibilities, as vital and integral steps in the process of achieving the end result: affordable, value-laden broadband services for all Americans.

7. Consistent with our coordinated approach to broadband policy, and working in particular with the USDA, we build here on the foundation established in the Commission's first step toward the national broadband plan, its recent *National Broadband Plan NOI*.⁷ In that notice, the Commission recognized that bold action will be necessary for the nation to achieve its goal of ubiquitous and affordable broadband for all, regardless of location, socioeconomic status, ethnic background, or any other factor. The *National Broadband Plan NOI* recognized "the incredible value of ubiquitous broadband, and the difficulties that lie ahead in ensuring its availability."⁸ The nation will need to overcome many obstacles in ensuring that every American citizen, American business, Tribal and local government, and public safety entity has full access to broadband services. Success in this endeavor will require the input and cooperation of many different entities—individual consumers, businesses and organizations, as well as federal agencies and Tribal, state, and local governments. We must marry the dynamic innovations and flexibility of the private sector with the policy vision of the public sector to create a model of how government and industry can partner to ensure ubiquitous broadband access.

8. I view this Report as a prelude to, and a building block for, the national broadband plan, which will address in greater detail and on a vastly more complete record, the input of all stakeholders and the steps the nation must take to achieve its broadband goals. I also view this Report, which reflects input from a nevertheless substantial array of stakeholders and presents significant information about rural America, as a compendium of information that will be useful in the development of the national broadband plan. The recommendations made today for a rural broadband strategy are a down payment on

⁶ Recovery Act § 6001(k).

⁷ *A National Broadband Plan for Our Future*, GN Docket No. 09-51, Notice of Inquiry, 24 FCC Rcd 4342 (2009) (*National Broadband Plan NOI*).

⁸ *Id.* at para. 123.

the development of the national broadband plan, as indeed many of the steps necessary for ensuring access to broadband capability throughout rural America also will be necessary to ensure such access in urban and suburban parts of the nation. Although the national broadband plan will be broader in scope, this Report provides another, critical step in the Commission's efforts to develop an effective, efficient, and achievable national broadband plan. No national broadband strategy can be undertaken without due consideration to the rural broadband infrastructure and the people it must serve. The likely success of rural initiatives is intimately linked to a sound national broadband policy that reflects the complex interdependencies of regulatory policies, economic issues, and technological innovations.

9. In the end, my goal is that all rural Americans, like their counterparts in more densely populated areas of the country, have the opportunity to reap the full benefits of broadband services. Certainly the challenges of deploying broadband across vast rural lands are daunting. But as long as a grade-school child living on a farm cannot research a science project, or a high school student living on a remote Indian reservation cannot submit a college application, or an entrepreneur in a rural hamlet cannot order spare parts, or a local law enforcement officer cannot download pictures of a missing child without traveling to a city or town that has broadband Internet access, we cannot turn back from these challenges. Rural America has shaped this nation's values and institutions, given us many of our greatest leaders, and been an engine of our economic progress, but it will be unable to compete in the digital global marketplace without access to broadband services.⁹ Now is the time to start developing solutions for building the critical broadband infrastructure that *all* Americans will need.

10. In developing these solutions, we are not starting from scratch. Many of the technologies and resources needed for rural broadband already exist and, with American ingenuity, will become faster and more powerful in the years to come. High-capacity fiber networks—once found only in dense urban cores—have been redesigned for residential use, and their performance continues to increase. Cable networks are being upgraded to a platform that will support data rates of up to 160 megabits per second (Mbps).¹⁰ While issues remain, broadband over power lines (BPL) continues to emerge as a viable technology option.¹¹ Wireless technologies are extending broadband into areas unreachable by cables and wires, and enabling consumers to be connected while on the move. Many wireless Internet service providers (ISPs) have used the IEEE 802.11 wireless local area network technologies (commonly known as Wi-Fi) to offer fixed wireless broadband services in areas not reached by wireline technologies.¹² Wireless providers have been launching new broadband technologies that allow subscribers to access the Internet, while mobile, at speeds that are beginning to rival those on landline networks.¹³ We expect to

⁹ See H.R. REP. NO. 110-256, pt. 1, at 231 (2007) (stating that businesses “from banks, to automotive repair shops, to new age technology industries need broadband service to compete in the digital global marketplace”).

¹⁰ DOCSIS (Data Over Cable Service Interface Specification) 3.0, which is capable of supporting downstream rates up to 160 Mbps or higher and upstream data rates of 120 Mbps, is being rolled out in cable systems across the country. See Press Release, CableLabs, CableLabs Issues DOCSIS 3.0 Specification Enabling 160 Mbps (Aug. 7, 2006), available at http://www.cablelabs.com/news/pr/2006/06_pr_docsis30_080706.html.

¹¹ See *Amendment of Part 15 Regarding New Requirements and Measurement Guidelines for Access Broadband over Power Line Systems; Carrier Current Systems, Including Broadband Over Power Line Systems*, ET Docket Nos. 04-37, 03-104, Report and Order, 19 FCC Rcd 21265, 21266, paras. 1–2 (2005). But see ARRL Comments at 3-6 (noting that there are obstacles to deployment of BPL systems that will need to be addressed, including interference with amateur radio and other licensed services).

¹² See WIRELESS BROADBAND ACCESS TASK FORCE, FCC, CONNECTED & ON THE GO 31–32 (2005), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-257247A1.pdf (WIRELESS BROADBAND ACCESS TASK FORCE REPORT).

¹³ For example, some Code Division Multiple Access (CDMA) carriers have deployed 1xEV-DO (EV-DO) Revision A (Rev A) technology across their networks, which has average download speeds between 600 kilobits per second (kbps) and 1.4 Mbps, and average upload speeds between 350 and 800 kbps. In addition, the data rates offered by one mobile WiMAX service providers average between 2 and 4 Mbps downstream and between 500 kbps and 1.5

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see further advancements on the wireless broadband front as wireless service providers begin to build out networks using advanced technologies—such as Long Term Evolution (LTE) or Worldwide Interoperability for Microwave Access (WiMAX)—that support data rates that may exceed 100 Mbps.¹⁴ Finally, satellite broadband, with its near ubiquitous coverage and downstream data rates between 512 kbps and 5 Mbps, can provide a much-needed connection in rural areas, especially where other broadband solutions are not viable for technical or other reasons.¹⁵

11. The solutions for rural broadband should reflect consideration of the full range of technological options available, and should not elevate the need for short-term progress over longer-term objectives. Rural broadband likely will include a variety of different technologies that together can support the state-of-the-art, secure, and resilient broadband service that should be our goal for rural America, just as it is for the non-rural parts of the nation.¹⁶ However the rural networks are configured, they should be designed on principles of durability, reliability, openness,¹⁷ scalability, and interoperability so that they can evolve over time to keep pace with the growing array of transformational applications and services that are increasingly available to consumers and businesses in other parts of the country.

12. Although we are at an early stage in the national effort, the Report makes a number of recommendations that I hope will facilitate the rapid and widespread buildout of state-of-the-art broadband access facilities to every street corner and winding road, and every home and business in America. Such a transformation will rival the building of the roads, canals, and ports that made commerce possible in pre-Civil War America; the transcontinental railroads that made us a continental power in the late nineteenth century; the national highway system that opened the way for rapid transportation and demographic migration in the last century; and the immense efforts to extend telephone and electrical service to the far corners of America. Technology, and the ability to be connected, can be an important part of addressing many of the problems rural America faces by, for example, enabling a student at a rural high school to participate in a seminar offered at a distant college, letting a patient in a rural clinic be examined by a specialist located in an urban hospital, or allowing a farm family to use a

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Mbps upstream. See *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, WT Docket No. 08-27, Thirteenth Report, DA 09-54, paras. 134–52 (WTB rel. Jan. 16, 2009) (*Thirteenth CMRS Competition Report*); Sascha Segan, *Sprint Xohm (Mobile WiMax)*, PC MAGAZINE, Oct. 10, 2008, <http://www.pcmag.com/article2/0,2817,2331483,00.asp>.

¹⁴ LTE can support up to 58 Mbps for upper link transmission and 173 Mbps for downlink transmission with 20 megahertz of spectrum and a 2x2 Multiple Input Multiple Output (MIMO) antenna structure. See RYSAVY RESEARCH AND 3G AMERICAS, *EDGE, HSPA AND LTE—THE MOBILE BROADBAND ADVANTAGE 16* (Sept. 2007), available at http://www.3gamericas.com/pdfs/2007_Rysavy_091007.pdf. Initial versions of the mobile WiMAX technology can support peak downlink data rates up to 63 Mbps and peak upper link data rates up to 28 Mbps in a 10 MHz channel. See *Mobile WiMAX – Part I: A Technical Overview and Performance Evaluation*, Mobile WiMAX Forum, August 2006, at 10, available at http://www.wimaxforum.org/technology/downloads/Mobile_WiMAX_PartI_Overview_and_Performance.pdf (last visited May 19, 2009).

¹⁵ There are currently three licensed satellite operators providing satellite-based broadband Internet access services. See HughesNet, *High Speed Internet Service Plans and Pricing*, <http://go.gethughesnet.com/plans.cfm> (last visited April 13, 2009) (showing list of HughesNet service packages ranging from 1-5 Mbps downstream and 128-300 kbps upstream); WildBlue Communications, *Detailed Package Comparison Chart*, <http://www.wildblue.com/getWildblue/details.jsp> (last visited May 19, 2009) (showing list of WildBlue service packages ranging from 512 kbps-1.5 Mbps downstream and 128-256 kbps upstream); Starband Inc., *New Starband Nova Series*, <http://starband.com/services/> (last visited April 13, 2009).

¹⁶ See, e.g., CFA/CU Comments at 2.

¹⁷ See *infra* Part VI.B (Network Openness).

smart grid to reduce its energy consumption.¹⁸ Thus, delivering ubiquitous broadband to rural areas will help to restore economic growth and opportunity for Americans residing and working in those areas.

II. OVERVIEW OF RECOMMENDATIONS

13. Congress directed the Chairman of the Commission to submit this Report to Congress, and I am pleased to do so. I believe the Commission should do more such reports for Congress—not establishing policies that require Commission approval—but putting forth recommendations, ideas, and options to advise Congress, government, and the public as they consider these important issues. I look forward to continuing to work on these issues with my colleagues and Congress and trust that this Report will help inform the discussion and provide a building block as the Commission develops its national broadband plan. In light of all this, the Report makes the following recommendations:

◆ **Coordination of Rural Broadband Efforts.** Increasing coordination—among federal agencies; Tribal, state, and local governments; and community groups and individuals—is a critical preliminary step towards ensuring that the various government programs accomplish their broadband goals and objectives in an efficient and effective way.

- **Improving Federal Agency Coordination.**

- The federal interagency working group, formed by the Obama administration to coordinate the administration’s broadband agenda, should continue its ongoing efforts to enhance interagency coordination of rural broadband initiatives; and
- The Commission and other federal agencies should consider developing their own “rural broadband agendas” consistent with the national broadband plan.

- **Other Coordination Efforts.**

- **Tribal Coordination.** To ensure a truly comprehensive strategy for addressing rural broadband deployment and adoption, it is important to maintain a continuing dialogue to address the unique issues presented in Tribal areas. As an integral part of their rural broadband initiatives:
 - (1) Federal agencies should consider how to maximize existing programs to improve coordination with Tribal governments; and
 - (2) The Commission should consult with Tribal governments pursuant to its *Tribal Policy Statement* in developing its national broadband plan and, in particular, in developing the aspects of that plan that affect broadband deployment and subscribership specifically on Tribal lands.
- **State Coordination.** The Commission and its state counterparts should take advantage of existing coordination mechanisms, such as the Federal-State Joint Conference on Advanced Services (Joint Conference). The Joint Conference should:
 - (1) Provide the Commission with its own recommendations for improving federal-state coordination regarding rural broadband;
 - (2) Include in its recommendations proposals for federal-state coordination to address and ameliorate the unique challenges presented to rural minority communities and persons with disabilities residing in rural areas; and

¹⁸ See Benton Foundation Comments at 16 (stating that in a smart grid, information flows within a customer’s house to thermostats, appliances, and other devices, and from the house back to the utility and that a smart grid includes smart meters, smart appliances, renewable energy resources, and energy efficiency resources).

(3) Compile an inventory of successful state and local projects and “best practices.”

- **Coordination with Communities.** In order to be successful in coordinating existing federal programs concerning rural broadband or rural initiatives, it is also critical that the federal government collaborate and coordinate with community and advocacy organizations in rural areas. The minority, disability, and low-income communities in rural areas face particular challenges. Federal agencies should work closely with organizations:

(1) To help ensure that all members of minority groups residing in rural areas have access to robust and affordable broadband services and that minority-owned businesses participate fully in the buildout of broadband infrastructure in those areas.

(2) Representing persons with disabilities to help ensure that they have affordable access to broadband services capable of supporting the full array of applications responsive to their needs.

(3) That serve low-income residents to ensure the opportunities that affordable broadband offers this community do not go unrealized.

- **Streamlining and Improving Existing Federal Programs.** All relevant federal agencies should review their programs to identify what internal barriers, if any, may be making rural broadband deployment more difficult.
- **Promoting Efficient Use of Government Funds and Resources.** Federal agencies should review their non-broadband-related programs that involve rural issues to assess whether those programs provide opportunities to promote rural broadband deployment.
- **Coordinating Program Criteria.** So that dissimilar definitions and criteria across related or complementary programs do not unnecessarily hinder interagency coordination, federal agencies involved in rural broadband should coordinate key terminology (e.g., rural) across programs, consistent with their legislative mandates.
- **Government Websites.** One barrier to rural broadband deployment and adoption is a lack of easily-accessible and coordinated information about government resources available for promoting broadband. To help address this problem, we recommend that the Commission expand its website to include a comprehensive set of links to all federal government programs related to rural broadband. We also suggest expanding the Commission’s and USDA’s existing “Broadband Opportunities for Rural America” website to include a comprehensive list of all federal government programs related to rural broadband.

◆ **Assessing Broadband Needs.** Congress directed that this Report make recommendations “to address both short- and long-term needs assessments” for rural broadband. The Report does this by addressing the challenges of rural broadband today and the needs of rural broadband going forward.

- **Technological Considerations.** Every rural area presents its own special challenges, and a particular technological solution may be well-suited to one situation and poorly-suited to another. Decision makers therefore should proceed on a technology-neutral basis—by considering the attributes of all potential technologies—in selecting the technology or technologies to be deployed in a particular rural area.
- **Information on Broadband Availability.** One significant challenge to ubiquitous broadband deployment in rural areas is obtaining accurate information on broadband service and infrastructure availability and the demand for broadband services. Pursuant to the Broadband Data Improvement Act (BDIA) and the Recovery Act, the Commission should work to collect

this information to better inform decision making, in coordination with the administration, and Tribal and state governments.¹⁹

- **Broadband Mapping.** In the rural context, broadband mapping is a necessary tool for identifying and tracking broadband service availability and infrastructure deployment, yet it is only as accurate and reliable as its underlying data. Pursuant to the Recovery Act and the BDIA, the Commission and the administration should continue their efforts to coordinate federal, Tribal, state, local, and private mapping efforts.
 - **Stimulating and Sustaining Demand for Broadband.** Various factors may affect demand for broadband services in rural areas, including a lack of knowledge regarding the benefits of Internet access, lack of training on how to use a computer, socioeconomic and demographic factors, and affordability. To help stimulate and sustain demand for broadband services in rural areas, both public and private entities should consider developing consumer education and training initiatives, broadband affordability programs, and other incentives to achieve sustainable penetration rates.
 - **Addressing Network Costs.** Relying on market forces alone will not bring robust and affordable broadband services to all parts of rural America. Therefore, all levels of government should explore ways to help overcome the high costs of rural broadband deployment.
- ♦ ***Overcoming Challenges to Rural Broadband Deployment.*** Because the national broadband plan is not due until February 2010, it is prudent for the Commission to identify any pending and proposed Commission proceedings affecting rural broadband. These pending proceedings include universal service reform, network openness, spectrum access, middle mile/special access reform, intercarrier compensation, access to poles and rights of way, tower siting, and video programming proceedings. The Commission should consider all these proceedings as it develops the national broadband plan, balancing the desire to resolve these matters with the need to address rural broadband in the context of a much broader and forward-looking national broadband plan. Of particular note, I continue to support comprehensive reform of the universal service program. It is of great interest to Congress, consumers, industry, and the Commission. I have long held the view that it is time for universal service to meet the communications challenge of the 21st century—broadband deployment—just as it did the communications challenge of the 20th century—telephone service.
- ♦ ***Status Report.*** To help inform Congress of any needed changes to the recommendations in this Report in light of additional efforts to address rural broadband issues, including the completion of the national broadband plan, the next Commission Chairman should consider completing a status report on rural broadband approximately one year from now.

III. BACKGROUND

A. Rural Broadband: Why it Matters

14. Broadband Internet access, often on small, easy-to-use devices, is rapidly transforming the way we communicate, work, learn, and play.²⁰ Touch-screen mobile devices, e-books, and Voice over Internet Protocol (VoIP) have become standard features in many people's daily lives. As broadband speeds have increased, we use the Internet to complete our education, receive medical care, communicate

¹⁹ Broadband Data Improvement Act of 2008, Pub. L. No. 110-385, 122 Stat. 4097 (2008) (codified at 47 U.S.C. §§ 1301–04) (BDIA).

²⁰ Broadband connections have grown at a remarkable rate. See INDUSTRY ANALYSIS & TECH. DIV., FCC, HIGH-SPEED SERVICES FOR INTERNET ACCESS: STATUS AS OF DECEMBER 31, 2007, at tbl. 2 (rel. Jan. 2009) (2009 HIGH SPEED REPORT) (showing that Internet connections with speeds exceeding 200 kbps in both directions grew from 4 million in 2000 to 80 million in 2007).

with our government, including on matters of public health and safety, run web-based businesses, and do our work. In addition, we not only surf the web, send e-mail, form social networks, and download music and video, but also become ourselves creators of web-based content as we blog about local or world events, and become publishers in our own right.

15. In rural areas, however, many Americans have no access to these applications and services, and by extension, to the global community. Rural communities have long been unserved or underserved by broadband technology, but the full implication of this divide has only emerged as the Internet has become less and less a novelty, and more and more a necessity. The Obama administration and Congress recognize that broadband access will benefit all Americans in much the same way that the nation as a whole benefited from our past successes in overcoming infrastructure challenges. Bringing ubiquitous and affordable broadband services to rural America will improve the quality of education, healthcare, and public safety in rural America, among other benefits. On a larger scale, ensuring that all Americans, including those in rural areas, have access to such services will help to improve America's economy, its ability to compete internationally, and its unity as a nation.

16. Deploying broadband throughout rural America will fundamentally benefit the nation's economy.²¹ One study estimates that communities having access to mass-market broadband grew disproportionately in employment, the number of information technology-oriented businesses, and the number of businesses overall.²² Economic development in rural areas, in turn, will foster demand for broadband subscriptions, broadband-delivered content, and broadband-capable devices. As with the basic telephone network, the more people that connect to the broadband network, the more value the network has for everyone on it, including initial users.²³ And just as rural electrification created a new group of home appliance consumers, so will a broadband-connected rural America want Internet Protocol (IP)-enabled phones, smart meters, telehealth, distance learning, video relay services, online music, streaming movies, interactive gaming, and a host of other broadband-related products and services. Simply put, broadband buildout to rural Americans promotes and encourages sustained economic development, to the benefit of us all.

17. The benefits of broadband extend particularly to small businesses in rural areas. With broadband, running a small web-based business in a rural location becomes a reality.²⁴ Craftspeople, particularly those with a national or international following, can deal directly with their customers—quickly and without expensive middlemen.²⁵ Local tourism authorities can more effectively market their

²¹ See, e.g., CONNECTED NATION, THE ECONOMIC IMPACT OF STIMULATING BROADBAND NATIONALLY (2008), available at http://www.connectednation.com/_documents/Connected_Nation_EIS_Study_Full_Report_02212008.pdf (finding that a 7% increase in broadband penetration to underserved areas could have a direct economic impact of \$134 billion annually).

²² WILLIAM H. LEHR *et al.*, MEASURING BROADBAND'S ECONOMIC IMPACT 16 (2006), http://www.andrew.cmu.edu/user/sirbu/pubs/MeasuringBB_EconImpact.pdf. There are other examples of rural communities that have benefited from broadband by attracting large businesses to their area. See, e.g., Cecilia Kang, *Rural Riddle: Do Jobs Follow Broadband Access?*, WASH. POST, Apr. 23, 2009, at A1 (noting that Lebanon, Virginia was able to attract two large companies, creating 700 well-paying jobs for residents, after broadband was installed throughout the town, yet a neighboring town that also installed broadband failed to attract large businesses and only created a “handful” of jobs, though some local businesses benefited).

²³ This is called a “network effect” and is discussed at note 297, *infra*.

²⁴ See, e.g., Black Dinah Chocolatiers, Welcome, <http://www.blackdinahchocolatiers.com> (last visited May 18, 2009) (linking to a gourmet chocolate business run from an island off the coast of Maine).

²⁵ For example, craftspeople can build and design their own Internet store on eBay. The eBay website allows merchants to track sales, provides discounting strategies, and provides a way to promote their stores on eBay or other Internet sites. See eBay, Stores, <http://pages.ebay.com/storefronts/shop.html> (last visited May 14, 2009). Similarly, craftspeople can sell their goods on Amazon.com through the Amazon.com Marketplace. See Amazon,

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attractions to potential visitors, shopkeepers can better manage their inventories, and travel to commercial centers can be dictated more by efficiency than necessity.

18. It is clear that access to fixed and mobile broadband services also has the potential to enhance the efficiency and productivity of a number of agricultural activities in rural areas. Farmers, particularly those with smaller operations or in more remote locations, can materially benefit from real-time access to weather and crop reports and to databases of local and national agricultural extension services.²⁶ For example, farmers can be warned if there is a heightened risk of a plant blight, a livestock disease, or an insect infestation; examine the problem; and know immediately what they need to do to address it.²⁷ They can call upon Internet-driven tools and applications to consult with experts and precisely calculate the additional inputs they might need to enable their fields to flourish and their animals to thrive—with less waste or risk to the environment.²⁸ Detailed online market information can help farmers time the sales of their products more profitably. Web-based interaction can help consumer-focused farmers develop a personal relationship with their clientele to assist in bringing the right products to markets at the right time—saving time, fuel, and frustration.

19. Broadband buildout to rural America also can enhance educational opportunities and the likelihood of academic achievement. Students without access to broadband cannot do the same type of homework as their counterparts who enjoy access to broadband, and students in certain rural areas are often many miles away from advanced educational institutions, such as colleges and universities. Broadband can significantly improve the quality of education by providing students in rural America with the ability to do online research, interact with their teachers and schools from home, and obtain college credit and college degrees, even though they are not physically on campus.²⁹

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Create a Product Detail Page, http://www.amazon.com/gp/help/customer/display.html/ref=mm_sys_fa_create?nodeId=10683361 (last visited May 19, 2009). Merchants can also create their own websites through several Internet service companies that provide a website template, an Internet address, and custom e-mail addresses for a monthly fee. *See, e.g.*, Homestead, <http://www.homestead.com/> (last visited May 14, 2009).

²⁶ For example, the National Agricultural Statistics Service (NASS) provides weekly growing reports listing planting, fruiting, and harvesting progress and the overall condition of selected crops in major agricultural producing states. This information is available via e-mail subscription to farmers. *See* USDA, NASS, <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1048> (last visited May 14, 2009).

²⁷ Weekly weather reports for 44 states are available from the National Agricultural Statistics Service. The reports provide farmers with a summary of relevant information ranging from the number of days suitable for fieldwork, yearly comparisons to past harvests, and whether farmers were using alternative methods to maintain their crops. *See* USDA, NASS, Weekly Weather National Summary, <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?jsessionid=2889DCE2E86B04AD9EB296EC53307AB1?documentID=1573> (last visited May 19, 2009). *See also* ANIMAL AND PLANT HEALTH INSPECTION SERVICE, USDA, FOOT-AND-MOUTH DISEASE (Feb. 2007), http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_foot_mouth_disease07.pdf (last visited May 15, 2009) (providing a fact sheet on a particular disease).

²⁸ For example, USDA provides reports and databases on dairy, poultry, and livestock, including chemical usage, losses due to animal death, and historical tracking records. *See* USDA, National Agricultural Statistics Service, Historical Track Record—Livestock, <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1595> (last visited May 19, 2009).

²⁹ One non-profit organization has claimed dramatic results with its broadband efforts in one rural area. The One Economy Corporation provides laptops and broadband connections throughout rural Greene County, North Carolina. Among other noted improvements in student achievement, the program notes that the percentage of high school students applying to college was greatly improved from when the program began, and the high school dropout rate has been reduced. *See* One Economy Corporation, Bring IT Home, http://www.one-economy.com/sites/all/files/a_replicable_model.pdf (last visited May 14, 2009).

20. Bringing broadband to rural residents can also help improve healthcare. Often, the full range of health care services is not available in rural areas, because vast distances and low population densities make access to care, particularly specialty care, uneconomic. With sufficiently robust broadband services, clinics in rural areas can have access to facilities and specialists in more-densely populated areas. At a time when rising health care costs are a national challenge, this ability to leverage our health care resources would benefit all Americans.

21. Broadband also is essential to meeting our public safety and homeland security needs. Experience has made us acutely aware of the importance of communications in the event of an accident, natural disaster, or terrorist attack. We also know that the Internet can continue to function during these types of disasters, providing more reliable communications for first responders and the public.³⁰ First responders, public health officials, and government workers increasingly use broadband to share critical, time-sensitive public safety and security information with each other and with their communities.³¹ All Americans, including those in rural areas, must have access to broadband to be put on alert and kept in contact in the event of a local, state, or national emergency.

22. Broadband access to the Internet throughout rural America would be particularly valuable in assisting people with disabilities to realize their full potential.³² For example, broadband can allow individuals with hearing disabilities to use their computers and video equipment to communicate in real time in a visual and unfiltered manner, rather than on a delayed basis through a specialty device such as a TTY. Broadband also can let distant sign-language interpreters assist these individuals with essential tasks, such as communicating with doctors or participating in business meetings.³³ With broadband connections, people who are blind or visually impaired can use adaptive equipment that directs them to

³⁰ Benton Foundation Comments, Attach. at 28 (stating that on September 11, 2001, while 95% of cell phone calls made at 11:00 a.m. failed to get through, only 2% of Internet addresses remained off-line for an extended period, illustrating the Internet's overall resilience).

³¹ For example, today, some public safety answering points (PSAPs) can send a map showing a distressed caller's location to the nearest fire department or police station or can alert Internet-connected devices to a hazardous spill or weather condition. See DEP'T OF TRANSP., NEXT GENERATION 9-1-1 SYSTEM PRELIMINARY CONCEPT OF OPERATIONS 8–10, 17–19 (2005), <http://www.its.dot.gov/NG911/pdf/ConOps.pdf>; see also Department of Transportation, Research and Innovative Technology Administration, Intelligent Transportation Systems, Examples and Scenarios, http://www.its.dot.gov/NG911/ng911_ex.htm (last visited Apr. 13, 2009).

³² See Deborah Kaplan, former executive director of the World Institute on Disability, *Broadband: A Vital Link for People with Disabilities*, available at <http://www.wid.org/publications/broadband-a-vital-communications-link-for-people-with-disabilities> (last visited April 14, 2009). Both Congress and the Commission have recognized the tremendous value that broadband networks bring in improving communications with and among people with disabilities and have undertaken efforts to bring more opportunities to them. See, e.g., The Assistive Technologies Act of 2004, Pub. L. No. 108-364, 118 Stat. 1707 (2004) (codified at 29 U.S.C. §§ 3001-07) (supporting state efforts to improve provision of assistive technology to individuals with disabilities); The Americans with Disabilities Act of 1990, Pub. L. No. 101-336, 104 Stat. 327, Title IV (1990) (codified at 47 U.S.C. § 225) (requiring common carriers to provide telecommunications relay services for individuals with hearing and speech disabilities); *Amendment of the Commission's Rules Governing Hearing Aid-Compatible Mobile Handsets*; *Petition of American National Standards Institute Accredited Standards Committee C63 (EMC) ANSI ASC C63®*, WT Docket No. 07-250, First Report and Order, 23 FCC Rcd 3406 (2008) (adopting hearing aid compatibility requirements for mobile wireless devices); 47 C.F.R. § 64.601–06 (providing Commission's telecommunications relay service rules).

³³ The Benton Foundation urges the Commission to initiate and expand programs and policies that extend broadband to persons with disabilities, “those that are generally on the wrong side of the digital divide.” Benton Foundation Comments at 32. We also note that, in the recently released *National Broadband Plan NOI*, we sought comment on, among other things, what it means for a person with disabilities to “have access” to broadband capabilities, and whether, and if so, how, to ensure that the technical characteristics of current and future broadband networks align with the needs of disabled citizens. See *National Broadband Plan NOI*, at para. 28.

the information on a web page that they are likely to find most useful.³⁴ Broadband connections also can enable individuals who have difficulty walking to visit the library or shopping mall, to name two uses among many.

23. Furthermore, broadband offers potentially enormous environmental benefits. Broadband network technology distributes information efficiently. Its ubiquitous deployment and use would have immense potential to help create a greener planet through the miles not driven or flown. Telecommuting, teleconferencing, and videoconferencing all could reduce drastically both commuting and general purpose travel, and the associated carbon emissions.³⁵ Increased use of electronic documents lessens the need for paper, leaving more trees growing in forests.³⁶ Broadband enabled smart-grid technologies help utilities balance their network loads more accurately, making energy distribution more efficient.³⁷ E-commerce complements and simplifies physical distribution networks and can make both business and consumer transactions both more efficient and environmentally friendly.³⁸

24. Finally, broadband deployment in those rural areas where poverty is historical and structural is particularly important.³⁹ Properly implemented, connection via broadband to the wider world offers a boost to people caught in a cycle of poverty. The need for distance learning and telemedicine is most acute in such areas. We must see that broadband infrastructure and the means to use it reach rural communities that have been redlined, neglected, or segregated from better-served areas.

25. The many benefits to the public demonstrate the necessity of ensuring that robust and affordable broadband is available to all Americans. Further, America's economy depends on ensuring that all Americans, including those in rural areas, have access to broadband and are able to compete in this connected, global economy. According to Dr. Vinton Cerf, in the future, billions of devices will be accessible through the Internet at ever-increasing speeds,⁴⁰ using applications that, for the most part, have

³⁴ See American Foundation for the Blind, AFB Senior Site, Using Technology, <http://www.afb.org/seniorsite.asp?SectionID=67&DocumentID=3336> (last visited May 15, 2009).

³⁵ JOSEPH P. FUHR JR. & STEPHEN B. POCLASK, AMERICAN CONSUMER INSTITUTE, BROADBAND SERVICES: ECONOMIC AND ENVIRONMENTAL BENEFITS 2 (2007), <http://www.theamericanconsumer.org/2007/10/31/broadband-services-economic-and-environmental-benefits/>.

³⁶ JOSEPH ROMM *et al.*, THE CENTER FOR ENERGY AND CLIMATE SOLUTIONS, THE INTERNET ECONOMY AND GLOBAL WARMING: A SCENARIO OF THE IMPACT OF E-COMMERCE ON ENERGY AND THE ENVIRONMENT 5–6 (1999), <http://www.p2pays.org/ref%5C04%5C03784/0378401.pdf> (JOSEPH ROMM *et al.*).

³⁷ See, e.g., Peter Slevin and Steven Mufson, *Stimulus Dollars Energize Efforts To Smarten Up the Electric Power Grid*, WASH. POST, Mar. 10, 2009, at A1.

³⁸ JOSEPH ROMM *et al.* at 6–7.

³⁹ See generally MMTC Comments.

⁴⁰ See Youtube, Dr. Vinton G Cerf, Internet, Infinity and Beyond, <http://www.youtube.com/watch?v=-4R9FeBh9Kc> (last visited May 5, 2009); see also The Connections Show, Connections #52—History of the Internet: Part III (Future), at 4:40–5:00 (posted Mar. 22, 2009), <http://connections.thepodcastnetwork.com/2009/03/22/connections-052-history-of-the-internet-part-iii-future/> (last visited May 5, 2009). See also Carl Fussman, *What I Have Learned: Vint Cerf*, ESQUIRE, Apr 24, 2008, http://www.esquire.com/features/what-ive-learned/vint-cerf-0508?click=main_sr; Youtube, Vint Cerf on the Internet's Future, at :38–:58 (posted Sept. 17, 2007), <http://www.youtube.com/watch?v=Yv6igXryFSw&feature=related> (last visited May 5, 2009). Dr. Vinton G. Cerf is Vice President and Chief Internet Evangelist for Google where he identifies new Internet applications. He is co-creator of TCP/IP (with Robert Kahn) and is widely known as “Father of the Internet.” See National Institute of Standards and Technology, Visiting Committee on Advanced Technology, Vinton G. Cerf, <http://www.nist.gov/director/vcat/cerf.htm> (last visited May 19, 2009).

yet to be conceived.⁴¹ Broadband is the interstate highway of the 21st century for small towns and rural communities, the vital connection to the broader nation and, increasingly, the global economy. Our nation as a whole will prosper and benefit from a concerted effort to bring broadband to rural America.

B. The State of Broadband in Rural Areas

26. Our efforts to bring robust and affordable broadband to rural America begin with a simple question: what is the current state of broadband in rural America? We would like to answer this question definitively, and detail where broadband facilities are deployed, their speeds, and the number of broadband subscribers throughout rural America. Regrettably, we cannot. The Commission and other federal agencies simply have not collected the comprehensive and reliable data needed to answer this question. As the Commission has indicated, more needs to be done to obtain an accurate picture of broadband deployment and usage in America, including its rural areas.⁴² As discussed below, Congress recently enacted legislation that will help us obtain more complete data on the deployment and adoption of broadband service: the BDIA and the Recovery Act.⁴³

27. While these two pieces of commendable legislation together will improve the federal government's ability to collect broadband data, the information we have today demonstrates that broadband service in rural America is generally inadequate.⁴⁴ Although inexact, currently available data and studies suggest that, in comparison to non-rural areas, broadband services are less extensively adopted in rural areas generally, and that this stems in part from less extensive deployment of broadband capability in rural areas. The *2008 Pew Broadband Adoption Study* found that a much larger proportion of urban and suburban residents have broadband at home (57-60 percent) than rural residents do (38 percent).⁴⁵ And according to NTIA, while 54 percent of urban households had broadband in the home in 2007, only 39 percent of rural households did.⁴⁶ Mobile broadband networks also cover more urban than rural areas. We estimate that, although mobile broadband networks cover 95.6 percent of the total U.S.

⁴¹ See Youtube, Vint Cerf on the Internet's Future, at 2:20–3:15 (posted Sept. 17, 2007), <http://www.youtube.com/watch?v=Yv6igXryFSw&feature=related> (last visited May 5, 2009).

⁴² See, e.g., *Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscribership Data, and Development of Data on Interconnected Voice over Internet Protocol (VoIP) Subscribership*, WC Docket No. 07-38, Notice of Proposed Rulemaking, 22 FCC Rcd 7760, 7765–66, para. 10 (2007).

⁴³ See *supra* Parts III.D (Recent Legislative Developments) & V.B (Assessment of Broadband Deployment).

⁴⁴ See, e.g., CFA/CU Comments at 2 (“[R]ural Americans are severely disadvantaged in broadband access”).

⁴⁵ See PEW INTERNET & AMERICAN LIFE PROJECT, HOME BROADBAND ADOPTION 2008, at 3 (2008), available at http://www.pewinternet.org/~media/Files/Reports/2008/PIP_Broadband_2008.pdf (2008 PEW BROADBAND ADOPTION STUDY). The survey was conducted by phone from April 8, 2008 to May 11, 2008 among 2,251 American adults, 1,153 of whom were broadband users. *Id.* at 22.

⁴⁶ Compare NTIA, HOUSEHOLDS USING THE INTERNET IN AND OUTSIDE THE HOME, BY SELECTED CHARACTERISTICS: TOTAL, URBAN, RURAL, PRINCIPAL CITY, 2007 (2008), tbl. 3, http://www.ntia.doc.gov/reports/2008/Table_HouseholdInternet2007.pdf (last visited Apr. 10, 2009) (NTIA, HOUSEHOLDS USING THE INTERNET) (providing broadband statistics for urban areas from the U.S. Census Bureau's (Census Bureau) Current Population Survey) with *id.* tbl. 5 (providing broadband statistics for rural areas). State surveys also suggest that people who live in rural areas lack broadband service more often than urban dwellers do, but results vary widely, and, again, may reflect different definitions and methodologies. See, e.g., CONNECT OHIO TECHNOLOGY ASSESSMENT: EXECUTIVE SUMMARY at 9 (June 27, 2008), http://connectoh.org/_documents/Res_OHExecutiveSummary06252008_FINAL.pdf; CALIFORNIA BROADBAND TASK FORCE, THE STATE OF CONNECTIVITY, BUILDING INNOVATION THROUGH BROADBAND, FINAL REPORT at 18 (Jan. 2008), www.calink.ca.gov/pdf/CBTF_FINAL_Report.pdf (last visited Apr. 1, 2009) (CALIFORNIA BROADBAND REPORT).

population, they cover only 82.8 percent of the U.S. rural population compared with 99.0 percent of the non-rural population.⁴⁷

28. We also are unable to provide the state of broadband deployment in rural areas among, for example, minorities, those with disabilities, and those residing on Tribal lands. Broadband deployment to these groups is of particular concern because they may benefit the most from broadband deployment and adoption.⁴⁸ With respect to minorities, the data we have show that minorities typically have lower adoption rates than non-minorities.⁴⁹ Low subscription rates may be explained partly by a lack of computer ownership.⁵⁰ However, the most accurate marker for low broadband adoption is most likely low income.⁵¹

29. Similarly, we know even less about broadband access in rural areas for people with disabilities, in part because we lack properly disaggregated information. Some research data show that fewer than 30 percent of people with disabilities over the age of 15 use the Internet; by comparison, more than 60 percent of those with no disability use the Internet.⁵² Moreover, data also show that people with disabilities, both inside and outside metropolitan areas, use the Internet less than their geographic counterparts with no disability, and people with disabilities outside metropolitan areas have a very low rate of Internet use (26.7 percent).⁵³

30. Many Tribal lands also lack broadband service, but we lack data describing availability or subscribership.⁵⁴ Many Native Americans are still struggling to receive basic telephone service and,

⁴⁷ These estimates are based on an analysis of network coverage maps submitted to the Commission by American Roamer in February 2009 and on 2000 Census Block information. American Roamer is an independent consulting firm that tracks service provision for mobile voice and mobile data services. The Commission describes how it analyzes mobile network coverage in the *Thirteenth CMRS Competition Report*. See *Thirteenth CMRS Competition Report*, paras. 37–39, 144–47.

⁴⁸ See, e.g., Benton Foundation Comments, Attach. at 32; MMTC Comments at 2.

⁴⁹ For example, the 2008 *Pew Broadband Adoption Study* found that African-Americans had a lower broadband adoption rate than similarly situated whites (43% versus 57%). 2008 PEW BROADBAND ADOPTION STUDY at 3. Connected Nation found a broadband adoption rate of 33% for rural minorities and 40% for rural non-minorities. See CONNECTED NATION, THE CALL TO CONNECT MINORITY AMERICANS: A CONNECTED NATION POLICY BRIEF, at 1 (2009) (CONNECTED NATION POLICY BRIEF), http://www.connectednation.org/_documents/cn_minority_policybrief_final_031609.pdf. Internet for Everyone reported that “40% of racial and ethnic minority households subscribe to broadband, while 55% of non-Hispanic white households are connected.” INTERNETFOREVERYONE.ORG, ONE NATION ONLINE at 1 (2008), http://www.freepress.net/files/IFE_Brochure.pdf (last visited May 14, 2009).

⁵⁰ See CONNECTED NATION POLICY BRIEF at 1 (showing computer ownership and subscription rates of 76% and 52% among Whites, 70% and 47% among Hispanics, and 65% and 46% among African-Americans); U.S. CENSUS BUREAU, COMPUTER AND INTERNET USE IN THE UNITED STATES: 2003, at tbl. A (2005) (showing that overall 62% of households have a computer compared to 44% of Hispanic households), <http://www.census.gov/prod/2005pubs/p23-208.pdf>.

⁵¹ Overall, fewer than 35% of households earning a family income of less than \$50,000 subscribe to broadband services, compared to 76% of households earning a family income more than \$50,000. NTIA, HOUSEHOLDS USING THE INTERNET at tbl. 1. See also Connected Nation Comments at 9; Verizon Comments at 13.

⁵² See JENIFER SIMPSON, TELECOMMUNICATIONS & TECHNOLOGY POLICY, AMERICAN ASSOCIATION OF PEOPLE WITH DISABILITIES (AAPD), FACTORS PROMOTING BROADBAND USE BY PEOPLE WITH DISABILITIES at 1 (2008), www.aapd.com/TTPI/Broadband_Policies_and_PWDs_by_Jenifer_Simpson.pdf.

⁵³ *Id.*

⁵⁴ For purposes of this Report, the term “rural areas” includes Indian Country, although not all of Indian Country is rural. To the extent that sections of Indian Country are rural in nature, they are likely to face the same—and some
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based on the Commission's data, have the lowest percentage of basic telephone service subscribers by group.⁵⁵ Indeed, 2007 data from the Census Bureau's Current Population Survey reveal that nationwide, American Indian/Alaskan Native households have a broadband subscription rate of only 30 percent, by far the lowest subscription rate among any ethnic group identified.⁵⁶ The situation is likely to be even worse in rural areas.⁵⁷

31. Although we do not have accurate data on broadband deployment in rural America, MMTC presents one community, Weirwood, Virginia, and through Weirwood gives "rural broadband deployment" a human face.⁵⁸ As MMTC describes it, Weirwood is an isolated rural community on Virginia's Eastern Shore, on the site of a former cotton plantation.⁵⁹ Weirwood is only a mile and a half from U.S. Route 13, along which lies a broadband Internet backbone.⁶⁰ The residents of Weirwood, however—mostly African-American descendents of former slaves—lack access to broadband. MMTC states that Weirwood has "absolutely no ability to raise internally" the funds needed to build a broadband node to the community from the existing backbone line.⁶¹ Pending acquisition of thorough, reliable, and disaggregated data, we glimpse through Weirwood the state of broadband deployment in impoverished rural areas.

32. Even without detailed maps of broadband service availability, we know that Weirwood is not unique. Whether we are discussing a historically African-American community like Weirwood, Tribal lands that even now lack access to voice telephone service, or individuals with disabilities whose access to broadband is essential, overall, there needs to be an active federal governmental role if all Americans are to have access to robust and affordable broadband services. The challenge we face is determining ways to adjust our efforts to ensure that the residents in places like Weirwood, or anywhere in rural America, are able to take advantage of the opportunities that come with broadband. As we have

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additional—difficulties in achieving increased broadband deployment as faced by "rural areas." Generally, we recognize that Indian Country is politically distinct and as a result historical and legal circumstances pose unique barriers to expanded broadband deployment. "Indian Country" means: (a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation; (b) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state; and (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same. 18 U.S.C. § 1151. For the purpose of this document Indian Country also includes Alaska Native Villages, Native Hawaiian Homeland, and Trust lands. While section 1151 is a criminal statute, its definition of Indian Country applies in the civil context as well. In this Report, we use "Indian Country," "Tribal areas," and "Tribal lands" interchangeably.

⁵⁵ See INDUS. ANALYSIS & TECH. DIV., FCC, TRENDS IN TELEPHONE at tbl. 16.5 (2008), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-284932A1.pdf (2008 TRENDS IN TELEPHONE); Standing Rock Sioux Tribe Comments at 2 (discussing comparable lack of basic telephone service for Indian households).

⁵⁶ NTIA, HOUSEHOLDS USING THE INTERNET at tbl. 1.

⁵⁷ For example, whereas 39.6% of American Indian/Alaskan Native urban households using the Internet subscribe to broadband service, only 16.9% of American Indian/Alaskan Native rural households using the Internet subscribe to broadband service. *Id.* at tbls. 3, 5.

⁵⁸ MMTC Comments at 2–3; see also Letter from Jocelyn Tate, Chair, Rural Broadband Working Group, Minority Media and Telecommunications Council, to Marlene H. Dortch, Secretary, FCC, GN Docket 09-29, at 1 (filed Mar. 30, 2009).

⁵⁹ MMTC Comments at 2.

⁶⁰ *Id.*

⁶¹ *Id.* at 2–3.

done in the past, America will overcome our broadband infrastructure challenges and reach our goal of providing broadband to all Americans, including those in rural areas.

C. America Overcomes Its Infrastructure Challenges

33. From the country's earliest days, building the nation's infrastructure has required federal resources and leadership, and this federal role continues. In generations past, the United States has faced and solved the challenges of connecting a vast and growing nation. In its earliest days, the young republic subsidized the delivery of newspapers by having the Postal Service deliver them for a fraction of the postal rate for letters. In the 1800s, the federal government partnered with private industry to lay the first transcontinental railroad. Beginning in the 1930s, the Rural Electrification Administration (REA) and its successor agency, the RUS financed hundreds of locally-owned utility cooperatives, enabling them to bring electric power and telephone service to rural America. The next generation saw the federal government work with the states to build the interstate highway system. Federal agencies also cooperated with scientists and universities, first to seed the Internet and later to grow its first backbone. At their inceptions, some of these projects were controversial. Many considered them too expensive; others doubted their efficacy. Today, few would question their value, but each of these undertakings depended on a strong and coordinated national vision.

1. The Postal System and Newspapers

34. America's founders believed that a postal system—the communications network of the eighteenth century—was vital to a democracy where people would govern themselves. The federal government passed laws and advanced policies to bring postal service even to remote areas of the country. From the United States government's early actions, we know the importance it attached to the postal system and the newspaper industry. As Benjamin Rush wrote, “[f]or the purpose of diffusing knowledge, as well as extending the living principle of government to every part of the united states—every state—city—county—village—and township in the union, should be tied together by means of the post-office. . . . It should be a constant injunction to the postmasters, to convey newspapers free of all charge for postage. They are not only the vehicles of knowledge and intelligence, but the centinels of the liberties of our country.”⁶²

35. To that end, President Washington signed into law the Post Office Act of 1792, which not only established the U.S. Postal Service, but also heavily subsidized newspaper delivery and exchange.⁶³ Abandoning the principle that each post office must be self-sustaining, Congress used the more-established post offices to subsidize postal roads and offices in remote areas of the expanding nation.⁶⁴ In less than fifty years, this prescient national vision had created the greatest postal system and news network in the world.⁶⁵ Newspapers, easily obtainable because of discounted postage rates, enjoyed

⁶² See BENJAMIN RUSH, ADDRESS TO THE PEOPLE OF THE UNITED STATES (1787), *available at* <http://teachingamericanhistory.org/library/index.asp?document=1779>; *see also* THE FEDERALIST NO. 84, at 517 (Alexander Hamilton) (Clinton Rossiter ed., 1961) (foreseeing that “public papers will be expeditious messengers of intelligence to the most remote inhabitants of the Union”).

⁶³ “The 1792 postal law, modified slightly in 1794, allowed newspapers—regardless of size, weight, or advertising content—to circulate within one hundred miles, or anywhere in the state of publication, for 1 cent; those mailed outside the state and beyond one hundred miles paid 1.5 cents. Letter postage, in contrast, was divided into nine zones, ranging from a minimum of 6 cents per sheet for delivery up to thirty miles to a maximum of 25 cents per sheet for any distance beyond 450 miles. . . . The privilege accorded the press was striking, especially considering the differences in size.” *See* STEVEN L. VAUGHN, ED., *ENCYCLOPEDIA OF AMERICAN JOURNALISM* 399 (2007).

⁶⁴ *Id.*

rapidly expanding subscribership, leading to the creation of still more newspapers.⁶⁶ The young government's policy quickly built a delivery system that rapidly expanded the newspaper industry, did not run a deficit, and reached "towns and villages deep in the interior" of the country.⁶⁷

2. The Transcontinental Railroad

36. A visionary public-private partnership also produced the world's first transcontinental railroad.⁶⁸ In 1862, in a nation divided by civil war, President Lincoln signed the Pacific Railway Act to connect gold-rich California to the Union.⁶⁹ Combining government bonds and land grants, the Pacific Railway Act commissioned two start-up rail companies to build the line: the Central Pacific starting from the west, and the Union Pacific, starting from the east.⁷⁰ In 1869, six years after the project began, a transcontinental rail line connected America across its harsh backland and challenging terrain, allowing travelers to go coast-to-coast in seven days. The next transcontinental railway lines would not be completed until 12 years later.⁷¹

3. Rural Electrification

37. Today we take the pervasiveness of electricity largely for granted, but in 1936, electricity reached only 11.6 percent of U.S. farms.⁷² Private investment had dried up as a result of the Depression,

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⁶⁵ See PAUL STARR, *THE CREATION OF THE MEDIA: POLITICAL ORIGINS OF MODERN COMMUNICATIONS* 86–90 (2004) (*CREATION OF THE MEDIA*). The number of U.S. post offices per 100,000 residents skyrocketed from 4.5 in 1775 to 74 in 1828. This 1828 number far exceeded the post offices per 100,000 persons in Great Britain at the time, 17, and France, 4. *Id.* at 87–88. In the mid-1800s, the French authorized a new post office only where it could generate \$200 in revenue annually, a principle that would have closed 90% of the post offices in the United States. RICHARD R. JOHN, *SPREADING THE NEWS: THE AMERICAN POSTAL SYSTEM FROM FRANKLIN TO MORSE* 52 (1996).

⁶⁶ See *CREATION OF THE MEDIA* at 87–88. British historian Michael G. Mulhall claimed that by 1840 the total weekly circulation of newspapers for the 17 million residents of the United States surpassed the weekly circulation for all of Europe, which had 233 million inhabitants at the time. *Id.*; MICHAEL G. MULHALL, *THE PROGRESS OF THE WORLD* 90 (Adamant Media Corp. 1998) (1880).

⁶⁷ See *CREATION OF THE MEDIA* at 86.

⁶⁸ See DEBORAH CADBURY, *DREAMS OF IRON AND STEEL* 153 (2005).

⁶⁹ See Pacific Railway Act of 1862, ch. 120, 12 Stat. 489 (1862) (Pacific Railway Act), *available at* <http://memory.loc.gov/cgi-bin/ampage?collId=llsl&fileName=012/llsl012.db&recNum=520> (last visited Apr. 28, 2009). The Pacific Railway Act also commissioned a transcontinental telegraph, which was built alongside the transcontinental rail line. See *id.* at 490–92. A telegraph network serving much of the country had emerged in the 1840s and 1850s out of commercial need, in part due to the large newspaper industry that the country had created. See *CREATION OF THE MEDIA* at 169–71.

⁷⁰ Kathy Weiser, *Legends of America, Old West Legends* (Feb. 2009), <http://www.legendsofamerica.com/rr-railroadcompanies.html> (last visited Apr. 24, 2009) (Weiser, *Old West Legends*). In 1885, the Central Pacific Railroad was leased by the Southern Pacific Company, though it technically remained a corporate entity until 1959 when it was formally merged into Southern Pacific, which in turn formally became a part of Union Pacific in 1996. See STUART DAGGETT, *CHAPTERS ON THE HISTORY OF THE SOUTHERN PACIFIC* 153 (1922); Weiser, *Old West Legends*.

⁷¹ The Atchison, Topeka, and Santa Fe; Southern Pacific; and Northern Pacific lines were completed between 1881 and 1883. Weiser, *Old West Legends*.

⁷² RUS, USDA, *A BRIEF HISTORY OF THE RURAL ELECTRIC AND TELEPHONE PROGRAMS* at A-1 (1982), <http://www.rurdev.usda.gov/rd/70th/rea-history.pdf> (last visited Apr. 20, 2009) (*A BRIEF HISTORY OF THE RURAL ELECTRIC AND TELEPHONE PROGRAMS*).

and private utility companies believed that rural, low-density areas were insufficiently profitable.⁷³ In response, President Franklin Roosevelt signed the Rural Electrification Act, envisioning a nationwide electric power generation, transmission, and distribution network. The Act created the REA, which financed rural electrification through federal low interest rate loans and loan guarantees.⁷⁴ Hundreds of locally-owned utility cooperatives formed across rural America and became the chief mechanism to compensate for the lack of private investment in low-profit rural areas.⁷⁵ The project was wildly successful; nearly 100 percent of U.S. farms and rural households now have electrical services.⁷⁶ The early successes of the rural electrification program led Congress in 1949 to expand the REA's mission to include the financing of rural telephone networks. People in rural areas would not have adequate, dependable, or urban-quality telephone service without federal government initiative and support.⁷⁷

38. The REA public-private partnership is a distinguished chapter in the economic development of the United States. It transformed rural life by boosting the productivity of rural farms and businesses, and allowing rural families to stay connected to the rest of the nation through telephone calls and radio broadcasts. Virtually all industries, businesses, and homes benefited. A shortsighted policy that brought the convenience, innovation, and new opportunities of electricity and telephone service only to urban and a smattering of rural areas could have created two Americas of utility haves and have-nots. We cannot make this mistake today.

4. The Interstate Highway System

39. The interstate highway system provides another example of the success public-private partnerships have had in stimulating infrastructure development. The Federal-Aid Highway Act of 1956 initially funded construction of the nation's interstate highways.⁷⁸ Funding continued until 1996, when the originally-planned network was near completion.⁷⁹ State governments received the bulk of the funds, owned the interstate highways, and awarded contracts to the private sector to construct the segments that lay within their boundaries. President Eisenhower, recognizing the capacity of a highway system to unify the country, said of the project, "[t]ogether, the uniting forces of our communication and transportation

⁷³ *Id.*

⁷⁴ REA was RUS's predecessor.

⁷⁵ USDA, USDA MARKS 70TH ANNIVERSARY OF LANDMARK RURAL LEGISLATION (2005), <http://www.rurdev.usda.gov/rbs/pub/jul05/70th.htm> (last visited Apr. 20, 2009). In the words of Wally Beyer, former administrator for the Utilities Program, during 1999 Congressional testimony, "Our agency exists in large part because the commercial marketplace was unable or unwilling to serve many rural Americans at a price that was affordable and conducive to economic development." As of 2005, about 37 million people in 47 states still received their electricity through cooperatives. *Id.* Of the rural electric systems established and supported by the approximately \$57 billion dollars in USDA debt financing between 1935 and 2000, about 96% were nonprofit cooperatives owned and operated by the consumers they served. RUS, USDA, CONNECTING RURAL AMERICA (2000), <http://www.rurdev.usda.gov/rd/pubs/pa1684.pdf>.

⁷⁶ A BRIEF HISTORY OF THE RURAL ELECTRIC AND TELEPHONE PROGRAMS at A-1.

⁷⁷ *Id.* The 2002 Farm Bill established the USDA Rural Development Broadband program under a similar debt financing system. USDA, USDA RURAL DEVELOPMENT: BRINGING BROADBAND TO RURAL AMERICA 4 (2007), <http://www.rurdev.usda.gov/rd/pubs/RDBroadbandRpt.pdf>.

⁷⁸ Facts on the construction, funding, and ownership of the interstate highways are available at the Department of Transportation website. U.S. Department of Transportation, Federal Highway Administration, History of the Interstate Highway System, <http://www.fhwa.dot.gov/interstate/history.htm> (last visited Apr. 20, 2009).

⁷⁹ *Id.*

systems are dynamic elements in the name we bear—United States. Without them, we would be a mere alliance of many separate parts.”⁸⁰

40. A concrete goal and steadfast leadership helped overcome the challenges that faced the interstate highway project in its early years. Many viewed it as an untried and risky project, immense in scope, impact, and cost.⁸¹ Advocates emphasized its necessity for economic growth and national unity.⁸² As it became obvious that the private sector and state governments could not keep pace with the needs of the country, debate grew over how to build and fund the project.⁸³ Different urban and rural needs and the existing patchwork of state-by-state approaches led to disagreements.⁸⁴ Stakeholders bickered over the mix of federal and state subsidies, fuel and other excise taxes, tolls, and financing through loans and bonds. Leaders were constantly challenged to adequately explain the project’s nuances and address public concerns in an informative and diplomatic manner.⁸⁵ The project moved forward despite these disagreements, and eventually became the interconnected network of roadways that Americans use extensively every day.

5. The Internet and Internet Backbone

41. The story of the Internet also starts with federal vision and funding. Responding to the 1957 launch of Sputnik, President Eisenhower started the Advanced Research Projects Agency (ARPA, renamed the Defense Advanced Research Projects Agency (DARPA) in 1972).⁸⁶ About a decade later, DARPA created ARPANet to link university computers, which created a network for communication among research centers.⁸⁷ Although decentralized, the ARPANet used the existing AT&T phone system, with DARPA leasing dedicated lines to avoid cumbersome dial-up connections.⁸⁸ The network infrastructure required that each participating research institution have dedicated computers to route the

⁸⁰ Press Release, White House, *Address to Congress on the Interstate Highway System* (Feb. 22, 1955), available at http://www.eisenhower.utexas.edu/Research/Digital_Documents/InterstateHighways/New%20PDFs/1955_02_22_Message_to_Congress.pdf.

⁸¹ W.L. Mertz and Joyce Ritter report that when President Eisenhower signed a 1954 highway act that preceded the main 1956 act he said, “That gets us started, but we must do more.” See W.L. MERTZ & JOYCE RITTER, U.S. DEP’T OF TRANSP., *BUILDING THE INTERSTATE* 3–4 (2006), available at <http://www.fhwa.dot.gov/infrastructure/build.pdf> (last visited Apr. 24, 2009) (*BUILDING THE INTERSTATE*).

⁸² See Remarks of Senator Edward Martin, *as reported by BUILDING THE INTERSTATE* at 4–5.

⁸³ See Remarks of Senator Francis Case at the 1957-1958 meeting of the American Association of State Highway Officials, *as reported by BUILDING THE INTERSTATE* at 20–21.

⁸⁴ See *id.*

⁸⁵ See Remarks of Rep. George Fallon at the 1957-1958 meeting of the American Association of State Highway Officials, *as reported by BUILDING THE INTERSTATE* at 22–23. “An enlightened and understanding public is not only essential to the success of your local highway programs but of immense help to members of Congress in their efforts to shape acceptable legislation. We need the support of the folks back home.” See *id.* at 23.

⁸⁶ See DARPA, DARPA History, <http://www.darpa.mil/history.html> (last visited Apr. 20, 2009); see also Mitch Waldrop, *DARPA and the Internet Revolution*, in *DARPA: 50 YEARS OF BRIDGING THE GAP* 83 (2008), available at http://www.darpa.mil/Docs/Internet_Development_200807180909255.pdf (last visited Apr. 28, 2009) (Waldrop, *DARPA and the Internet Revolution*).

⁸⁷ The four-node network was completed December 5, 1969, and connected the University of California, Los Angeles (UCLA), the Stanford Research Institute, the University of California–Santa Barbara, and the University of Utah. UCLA sent the first transmission to the Stanford Research Institute on October 29, 1969 at 22:30 PST. The first network e-mail using the “username@hostname” format was sent in 1971. See Waldrop, *DARPA and the Internet Revolution* at 83.

⁸⁸ “[N]o one master computer [was] responsible for sorting the packets and routing them to their destination.” *Id.*

traffic—the interface message processor (IMP)—to save the universities’ main computers from having to handle the burden.⁸⁹ In other words, DARPA was in charge of the backbone: it designed and implemented the network, leased the dedicated data lines, and financed the construction and implementation of the IMPs.⁹⁰ Each research institution was responsible for hooking up its computer to its respective IMP.⁹¹ By 1973, the number of entities using the network had grown from four to 40.⁹²

42. The federal government also played a role in the first Internet backbone when the National Science Foundation’s NSFNet became the *de facto* Internet backbone in 1986.⁹³ The networks created by and in response to DARPA’s efforts, and the “internetworking” capability offered by TCP/IP, made NSFNet the first network available to every U.S. campus.⁹⁴ Usage exploded.⁹⁵ Because NSFNet could not be used for profit,⁹⁶ the need for commercial Internet backbones arose. As a result, several commercial, interconnecting, national Internet backbone networks comprise the Internet backbone today.⁹⁷ Federal funding and visionary federal agencies created a noncommercial enterprise that would ultimately generate enormous sums of money, transform nearly every aspect of our daily lives, and change how the entire world communicates. This is the heritage we bring to the current challenge of comprehensive broadband deployment in rural areas.

⁸⁹ See *id.*

⁹⁰ See *id.*

⁹¹ See *id.*

⁹² ARPANet was the first of several packet-switched DARPA networks that would be created in the following 15 years. In order to allow these networks to talk to each other, traffic from each discrete network would go through a gateway computer—a “router”—that translated digitized packets from the originating network to the receiving network, so long as both networks met the interface standards. This was achieved January 1, 1983, when ARPANet began using version 4 of DARPA members Robert Kahn and Vinton Cerf’s Transmission Control Protocol/Internet Protocol (TCP/IP), allowing “inter-networking,” and arguably marking the birth of the Internet. Another government funded project—NSFNet—made ARPANet obsolete and ARPANet was formally discontinued in 1989. See *id.* at 83–85; see generally VINTON G. CERF, PACKET SATELLITE TECHNOLOGY REFERENCE SOURCES, REQUEST FOR COMMENTS: 829 (1982), available at <http://community.roxen.com/developers/ids/rfc/rfc829.html>.

⁹³ See Waldrop, *DARPA and the Internet Revolution* at 85. The purpose of this TCP/IP-based network was to link the existing regional networks to a new high-speed network of supercomputer centers. *Id.*

⁹⁴ See *id.*

⁹⁵ See *id.* The logarithmic increase in traffic caused the lines among the supercomputer centers to require two upgrades in four years. The capacity of the lines was upgraded from 56 kbps in 1987, to 1.5 Mbps in 1988, to 45 Mbps in 1991. See NSF, The Launch of NSFNet, <http://www.nsf.gov/about/history/nsf0050/internet/launch.htm> (last visited Apr. 20, 2009).

⁹⁶ See THE NSFNET BACKBONE SERVICES ACCEPTABLE USE POLICY § 10 (June 1992), available at http://w2.eff.org/Net_culture/Net_info/Technical/Policy/nsfnet.policy (last visited Apr. 23, 2009).

⁹⁷ The interconnection of the commercial Internet backbones first occurred at a “Commercial Internet eXchange,” or CIX, router in 1991. Although this particular router has been retired, there currently are over 150 similar types of nodes worldwide, referred to as Internet eXchange Points or IXPs. See generally Farooq Hussain, *Historic Role of The Commercial Internet eXchange Router And Its Impact On the Development of Internet eXchange Points [IXs]* (Oct. 3, 2003), <http://www.farooqhussain.org/projects/Historic%20Role%20of%20the%20CIX%20Router%2010-03-03.pdf> (last visited Apr. 22, 2009); see also EP.NET, llc Information, Exchange Point Information, <http://www.ep.net/ep-main.html> (last visited May 15, 2009) (providing a worldwide repository of IXPs); Packet Clearing House, Resources, Internet Exchange Directory, <https://prefix.pch.net/applications/ixpdir/> (last visited May 19, 2009).

D. Recent Legislative Developments

43. Recognizing the benefits of universal broadband access to the nation as a whole and the concomitant lack of robust broadband deployment in many parts of the country, Congress passed several important pieces of legislation in 2008 and 2009 to address the issue. Below, we discuss the 2008 Farm Bill, the BDIA, and the Recovery Act. Collectively, these pieces of legislation require the development of a rural broadband strategy, improvements in broadband data collection, and a national broadband plan.

1. 2008 Farm Bill—Rural Broadband Strategy

44. On June 19, 2008, Congress enacted the 2008 Farm Bill, which includes a provision requiring the Chairman of this Commission, in coordination with the Secretary of the USDA, to submit “a comprehensive rural broadband strategy” to Congress by May 22, 2009.⁹⁸ This strategy must include the following:

(1) recommendations—

(A) to promote interagency coordination of Federal agencies in regards to policies, procedures, and targeted resources, and to streamline or otherwise improve and streamline the policies, programs, and services;

(B) to coordinate existing Federal rural broadband or rural initiatives;

(C) to address both short- and long-term needs assessments and solutions for a rapid build-out of rural broadband solutions and application of the recommendations for federal, state, regional, and local government policymakers; and

(D) to identify how specific Federal agency programs and resources can best respond to rural broadband requirements and overcome obstacles that currently impede rural broadband deployment; and

(2) a description of goals and timeframes to achieve the purposes of the report.⁹⁹

The Chairman of this Commission must also, in coordination with the Secretary of the USDA, update and evaluate the rural broadband report during the third year after enactment of the 2008 Farm Bill.¹⁰⁰

⁹⁸ We note that the 2008 Farm Bill was initially enacted on May 22, 2008. *See* Pub. L. No. 110-234, 122 Stat. 923 (May 22, 2008) (May 22, 2008 Bill). The May 22, 2008 Bill, as enacted, however, did not include one title (*i.e.*, Title III—Trade) that Congress had intended to include. The June 18, 2008 Bill corrected this omission by repealing the May 22, 2008 Bill and enacting a statute that includes Title III but otherwise is identical to the May 22, 2008 Bill. *See* Pub. L. No. 110-246, 122 Stat. 1651 (June 18, 2008) (June 18, 2008 Bill or 2008 Farm Bill). The June 18, 2008 Bill specified that it would take effect on the earlier of the enactment date of that Bill or the enactment date of the May 22, 2008 Bill. *See* Pub. L. No. 110-246, § 4(b), 122 Stat. at 1664. We treat May 22, 2009, as the deadline for the rural broadband strategy report required by the Act.

⁹⁹ 2008 Farm Bill § 6112(a).

¹⁰⁰ *Id.* § 6112(b).

2. BDIA—Improving the Collection of Broadband Data

45. On October 10, 2008, Congress passed the BDIA, which provides for improved federal data on the deployment and adoption of broadband services.¹⁰¹ The BDIA mandates improvements in the Commission’s Section 706 Reports.¹⁰² Previously, that section directed the Commission to conduct a regular inquiry as to whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion.¹⁰³ The BDIA now requires the Commission to issue its Section 706 Reports “annually” instead of “regularly” and adds several types of data regarding broadband services that the Commission must produce and evaluate.¹⁰⁴ On March 31, 2009, the Commission released a Public Notice seeking comment on how it should implement certain of the requirements in the BDIA.¹⁰⁵

3. Recovery Act—National Broadband Plan

46. On February 17, 2009, Congress passed the Recovery Act.¹⁰⁶ The Recovery Act charges the Commission with developing a national broadband plan that “shall seek to ensure that all people of the United States have access to broadband capability and shall establish benchmarks for meeting that goal.”¹⁰⁷ By February 17, 2010, the Commission must deliver to Congress a national broadband plan that seeks to ensure that every American has access to robust broadband capability and establishes clear benchmarks for meeting that goal. The Commission’s plan must include an analysis of several specific elements of broadband deployment. First, the Commission must analyze “the most effective and efficient mechanisms for ensuring broadband access by all people of the United States.”¹⁰⁸ Second, the Commission must include “a detailed strategy for achieving affordability of such service and maximum utilization of broadband infrastructure and service by the public.”¹⁰⁹ Third, the Commission must include “an evaluation of the status of deployment of broadband service, including progress of projects supported by the grants made pursuant to this section.”¹¹⁰ Finally, the Commission must include “a plan for use of broadband infrastructure and services in advancing” a broad array of public interest goals.¹¹¹

47. The Recovery Act also provides significant support for programs that will accelerate the deployment of and subscription to broadband services throughout the nation. The Recovery Act charges RUS and the NTIA with making grants and loans to expand broadband deployment and for other

¹⁰¹ BDIA § 101. *See infra* Part V.B (providing additional information on the BDIA).

¹⁰² BDIA § 103(a).

¹⁰³ 47 U.S.C. § 157 nt. Since 1996, the Commission has initiated and completed five Section 706 Reports to Congress. *See, e.g., Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, GN Docket No. 07-45, Fifth Report, 23 FCC Rcd 9615 (2008) (*Section 706 Fifth Report*), *pet. for recon. pending*. In all five Section 706 Reports, the Commission has found that advanced services are being deployed in a reasonable and timely fashion. *Id.* at 9616, para. 1.

¹⁰⁴ BDIA § 103(c). *See infra* para. 97.

¹⁰⁵ *Comment Sought on International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act*, GN Docket No. 09-47, Public Notice, 24 FCC Rcd 3908 (2009) (*BDIA Public Notice*).

¹⁰⁶ *See supra* para. 4 (describing passage of the Recovery Act).

¹⁰⁷ Recovery Act § 6001(k)(2).

¹⁰⁸ *Id.* § 6001(k)(2)(A).

¹⁰⁹ *Id.* § 6001(k)(2)(B).

¹¹⁰ *Id.* § 6001(k)(2)(C).

¹¹¹ *Id.* § 6001(k)(2)(D).

important broadband projects. As noted above, by February 2011, the Recovery Act also directed NTIA to create a “comprehensive nationwide inventory map of existing broadband service capability and availability” that shows the geographic extent to which that capability is deployed and available for each state.¹¹² NTIA must make this inventory map accessible by the public on an NTIA website in a form that is interactive and searchable. These programs are discussed in detail below.¹¹³

IV. COORDINATION OF RURAL BROADBAND EFFORTS

48. As part of its mandate to develop a rural broadband strategy, Congress tasked us with developing recommendations to promote interagency coordination and to streamline and improve federal agencies’ policies, programs, and services.¹¹⁴ Congress also tasked the Commission with developing recommendations for coordinating existing federal rural broadband initiatives.¹¹⁵ These legislative requirements were established before the 2008 election and before the enactment of the Recovery Act. As there has been considerable interagency coordination in the weeks following the passage of the Recovery Act, the recommendations here are to support and promote the continued interagency coordination that now exists with the expectation that this will result in improvements to existing and new federal programs.

49. Much like extending the reach of railroads across the country or bringing electricity and telephones to rural areas, ensuring that broadband service is available to all Americans is a massive undertaking in which there is a significant role for government. In fact, a number of federal agencies have already developed and implemented programs related to the buildout of broadband in rural areas.

50. *The Role of the USDA’s RUS.* The USDA’s RUS plays a particularly important role in administering programs that aim to expand utilities and new technologies to rural communities. In particular, RUS administers three programs aimed specifically at improving broadband access: the Rural Broadband Access Loan and Loan Guarantee Program,¹¹⁶ the Community Connect Grant Program,¹¹⁷ and

¹¹² *Id.* § 6001(1).

¹¹³ *See infra* Parts IV, V.C (discussing the Recovery Act).

¹¹⁴ 2008 Farm Bill § 6112(a)(1)(A).

¹¹⁵ *Id.* § 6112(a)(1)(B).

¹¹⁶ The Rural Broadband Access Loan and Loan Guarantee Program provides loans and loan guarantees to fund the “cost of construction, improvement, or acquisition of facilities and equipment for broadband service,” with priority given to areas where broadband service is not available or is inadequate. RUS is in the process of promulgating regulations to implement program requirements mandated by the 2008 Farm Bill. *See* 7 C.F.R. § 1738.10–11; USDA Telecommunications Program: Rural Development Broadband Loan and Loan Guarantee Program, <http://www.usda.gov/rus/telecom/broadband.htm> (last visited May 19, 2009). We note that on April 13, 2009, USDA’s Inspector General released an audit report regarding RUS’s broadband loan program, finding that the agency had not implemented eight of fourteen recommendations from a 2005 audit report and expressing concerns about the future of the program. *See* OFFICE OF INSPECTOR GENERAL, USDA, REPORT NO. 09601-8-Te, AUDIT REPORT: RURAL UTILITIES SERVICE BROADBAND LOAN AND LOAN GUARANTEE PROGRAM 4, 10 (2009), *available at* <http://www.usda.gov/oig/webdocs/09601-8-TE.pdf>. We understand that the 2008 Farm Bill addressed six of these recommendations, and RUS is taking responsive action to the extent it can, regarding the remaining two recommendations. *See id.* at 4.

¹¹⁷ The Community Connect Grant Program provides financial assistance to unserved areas to connect critical community facilities, such as schools, libraries, hospitals, law enforcement, emergency services, and public safety organizations. Funds may be used to finance the construction and acquisition of facilities to deploy broadband and to purchase end-user equipment. At a minimum, a project must deploy basic broadband to critical community facilities free of charge for two years; offer basic broadband to all residential and business customers within the service area; and provide free access at a community center for at least two years. *See* Broadband Grant Program, 69 Fed. Reg. 44,896, 44,897 (Jul. 28, 2004); 7 C.F.R. § 1739.11–12.

the Distance Learning and Telemedicine Loan and Grant Program.¹¹⁸ The funding available under these programs to expand broadband coverage helps offset prohibitively high deployment costs that plague many rural areas. As part of the Recovery Act, Congress authorized an additional \$2.5 billion in funding for these programs.¹¹⁹

51. Numerous RUS programs have already started to increase rural broadband deployment. For example, as early as 2004, RUS began to work with International Broadband Electric Communications, Inc. (IBEC) in Huntsville, Alabama, to fund deployment of broadband solutions in a number of rural locations.¹²⁰ As a result, residents in the targeted communities will be able, many for the first time, to access the Internet at speeds of up to 5 Mbps. Another company that has successfully worked with the RUS is Rural Telephone Service Co. (Rural Telephone), a Lenora, Kansas-based incumbent local exchange carrier (LEC) that began working with the RUS shortly after its incorporation in 1951. Rural Telephone has used RUS funding to become an operator of 29 exchanges in a rural area that averages two households per square mile.¹²¹ Through its competitive LEC affiliate, Nex-Tech, Rural Telephone also has used RUS funding to deploy fiber to the home infrastructure in neighboring towns. In many cases, Nex-Tech is bringing broadband to customers for the very first time.¹²²

52. RUS also has worked with Air Advantage LLC (Air Advantage), a wireless ISP headquartered in Frankenmuth, Michigan. Air Advantage uses a broad portfolio of wireless solutions to deliver reliable and secure broadband connectivity to thousands of rural businesses and residents in rural Eastern Michigan.¹²³ Over the past six years, the company has secured three RUS Community Connect Broadband Grants and used the Broadband Loan Program to expand the footprint of its wireless network and increase broadband connectivity to local businesses and residents.¹²⁴ Related developments include the creation of computer labs in two local community centers that provide the residents with free broadband Internet access¹²⁵ and the deployment of distance learning technologies throughout seven

¹¹⁸ The Distance Learning and Telemedicine programs provide a combination of loans and grants to improve educational and health care opportunities. The grant program focuses primarily on connecting students and teachers or medical providers and patients at separate locations, while the loan and combination loan/grant program seeks to fund additional resources to improve medical care and education. Funds generally are used to finance broadband infrastructure, purchase land and buildings, acquire end-user and other equipment, and provide technical assistance and instruction. See 7 C.F.R. §§ 1703.121, 1703.130, 1703.140; USDA Telecommunications Program: Loans and Grants, <http://www.usda.gov/rus/telecom/RDtelecom-loansandgrants.htm> (last visited May 19, 2009).

¹¹⁹ Recovery Act, Division A, Title I, Rural Utilities Service (RUS Appropriations).

¹²⁰ See, e.g., Press Release, IBEC (Feb. 2, 2004), <http://www.ibec.net/pdf/IBEC%20Achieves%20Conditional%20RUS%20approval%20for%20its%20BPL%20Solution.pdf>.

¹²¹ See Joan Engebretson, *Funding Fiber to the Farm*, TELEPHONY ONLINE, Feb. 5, 2007, http://telephonyonline.com/mag/telecom_funding_fiber_farm/ (quoting Larry Sevier, Rural Telephone CEO and General Manager, “As we grew from one rural exchange to 29, we put in the latest technology,” he said. “All through the process, we used the RUS program. This area is extremely sparsely populated, with an average of two households per square mile.”).

¹²² *Id.*

¹²³ See generally Presentation of Scott Zimmer, President of Air Advantage, Using Broadband To Make Rural Michigan A Better Place to Live and Work, <http://wireless.fcc.gov/outreach/presentations/saginaw2008/SuccessStories/SAGINAW%20-%20Air%20Advantage%20Success%20Story.pdf> (last visited May 8, 2009).

¹²⁴ See Press Release, Motorola Corporation (May 7, 2009), <http://news.prnewswire.com/DisplayReleaseContent.aspx?ACCT=104&STORY=/www/story/05-07-2009/0005021331&EDATE>.

¹²⁵ *Id.*

partner rural school systems using funding from an RUS Distance Learning/Telemedicine Grant.¹²⁶ In addition, the Air Advantage network has linked several rural hospitals to enable data and record sharing, as well as enabling the Saginaw Valley State University to establish distance learning professional development courses at these healthcare facilities.¹²⁷ Air Advantage is using its most recent Community Connect Broadband Grant, approved in 2008, to provide wireless broadband access to the small community of Applegate, Michigan, where it is working with local officials to expand the village hall to include a new community center that will host a computer lab with free Internet access.

53. The RUS broadband programs face several challenges. Unlike some of RUS's other infrastructure programs, the RUS broadband programs only have a limited ability to offer projects combining loan and grant funds. The primary RUS broadband program is the Broadband Loan Program. Under the Broadband Loan Program, it is difficult for RUS to reach small remote places, like Weirwood, Virginia, because the community lacks the needed resources to make a broadband loan work. Places like Weirwood are better candidates for the Community Connect Broadband Grant program, but the funding for that program is severely limited (\$13.4 million for the 2009 fiscal year). However, the Recovery Act provides RUS the resources to administer a broadband program that offers assistance in the form of grants and loan/grant combinations designed to assist communities like Weirwood.

54. *NTIA*. The NTIA also has an important role to play in broadband development. The Recovery Act appropriates \$4.7 billion to the NTIA to "establish a national broadband service development and expansion program" called the "Broadband Technology Opportunities Program" (BTOP).¹²⁸ This program will award grants¹²⁹ to states, non-profit organizations, and broadband providers to fulfill the broadband deployment goals of the Recovery Act.¹³⁰ The NTIA must award, "to the extent practical," at least one grant in each state,¹³¹ and in doing so must consider a variety of factors,

¹²⁶ *Id.*

¹²⁷ *Id.*

¹²⁸ Recovery Act, Division A, Title II, National Telecommunications and Information Administration (NTIA Appropriations); Recovery Act § 6001. The BTOP has five enumerated purposes in the Recovery Act: "(1) provide access to broadband service to consumers residing in unserved areas of the United States; (2) provide improved access to broadband service to consumers residing in underserved areas of the United States; (3) provide broadband education, awareness, training, access, equipment, and support to [organizations including schools, libraries, health care providers, and outreach organizations]; (4) improve access to, and use of, broadband service by public safety agencies; and (5) stimulate the demand for broadband, economic growth, and job creation." Recovery Act § 6001(b); *see also* United States Department of Commerce, Information Related to the American Recovery and Reinvestment Act of 2009, <http://www.commerce.gov/Recovery/> (last visited May 19, 2009).

¹²⁹ NTIA may award competitive grants to: "(1) acquire equipment, instrumentation, networking capability, hardware and software, digital network technology, and infrastructure for broadband services; (2) construct and deploy broadband service related infrastructure; (3) ensure access to broadband service by community anchor institutions; (4) facilitate access to broadband service by low-income, unemployed, aged, and otherwise vulnerable populations in order to provide educational and employment opportunities to members of such populations; (5) construct and deploy broadband facilities that improve public safety broadband communications services; and (6) undertake such other projects and activities as the Assistant Secretary finds to be consistent with the purposes for which the program is established." Recovery Act § 6001(g).

¹³⁰ Specifically, the Recovery Act states, "To be eligible for a grant under the program, an applicant shall—(1)(A) be a State or political subdivision thereof, the District of Columbia, a territory or possession of the United States, an Indian tribe (as defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450(b)) or native Hawaiian organization; (B) a nonprofit—(i) foundation, (ii) corporation, (iii) institution, or (iv) association; or (C) any other entity, including a broadband service or infrastructure provider, that the Assistant Secretary finds by rule to be in the public interest. In establishing such rule, the Assistant Secretary shall to the extent practicable promote the purposes of this section in a technologically neutral manner." *Id.* § 6001(e).

¹³¹ *Id.* § 6001(h)(1).

including affordability and speed, as well as improved access for healthcare, education, and children,¹³² and “whether the applicant is a socially and economically disadvantaged small business concern.”¹³³ Grantees under this program will also be subject to “non-discrimination and network interconnection” obligations.¹³⁴

55. In addition, the Recovery Act requires NTIA to “develop and maintain a comprehensive nationwide inventory map of existing broadband service capability and availability in the United States that depicts the geographic extent to which broadband service capability is deployed and available from a commercial provider or public provider throughout each State.”¹³⁵ Such a map is required to be made accessible in an interactive and searchable format on the web by February 17, 2011.¹³⁶

56. *Other Agencies.* There are several other programs run by various federal agencies, including the Commission, that provide or have provided broadband-related funding.¹³⁷ Developed essentially in administrative silos and existing in parallel within their respective administrative agencies, these programs are responsible for significant annual spending. We believe that in enacting the 2008 Farm Bill, Congress implicitly recognized that many of these programs do share common broadband purposes and goals; however, coordination between federal agencies has been lacking. As Congress recognized, greater coordination among agencies, policies, programs, and staff is needed to realize the full benefit of federal resources that have already been dedicated to bringing broadband to rural America and to best leverage further investments of both taxpayer monies and private capital. We recognize positive changes that have occurred in recent months with regard to broadband coordination to address these prior shortcomings.

A. Promoting Interagency Coordination

57. Lack of interagency coordination is a significant challenge to the deployment of broadband in rural areas. Consequently, we believe that increasing coordination—among federal departments and agencies; Tribal, state, and local governments; community groups; and individuals—is a critical preliminary step toward ensuring that the various government programs accomplish their broadband goals and objectives in an efficient and effective way. Promoting and fostering a culture that encourages the exchange of information within and between federal agencies and, where appropriate, with non-federal government organizations, Tribal governments, and the public lie at the core of effective coordination. Successfully implemented, the coordination strategy we outline below should enable the federal government and other stakeholders to work together to maximize resources, harness expertise, and avoid duplication of effort in facilitating the deployment of broadband in rural areas.

58. In highlighting areas where better coordination may be needed, we hope to underscore the particular challenges faced by rural America in the deployment and adoption of broadband services that should be considered in conjunction with every agency’s broadband policy. To this end, the

¹³² *Id.* § 6001(h)(2).

¹³³ *Id.* § 6001(h)(3).

¹³⁴ *Id.* § 6001(j). Section 6001(j) of the Recovery Act states, “Concurrent with the issuance of the Request for Proposal for grant applications pursuant to this section, the Assistant Secretary shall, in coordination with the Commission, publish the non-discrimination and network interconnection obligations that shall be contractual conditions of grants awarded under this section, including, at a minimum, adherence to the principles contained in the Commission’s broadband policy statement (FCC 05-15, [1] adopted August 5, 2005).” *Id.*

¹³⁵ Recovery Act § 6001(l).

¹³⁶ *Id.*

¹³⁷ Appendix B provides a non-exhaustive list of these programs.

Commission has invited suggestions from the public on both formal and informal means of coordination among federal departments and agencies; Tribal, state, and local governments; and community groups and individuals to achieve Congress's goal that *all* Americans have access to broadband.¹³⁸

1. Federal Interagency Coordination

59. Shortly after President Obama took office, his administration undertook an important leadership role in the effort to expand broadband penetration throughout the nation. In early 2009, the Obama administration formed an interagency working group under the auspices of the National Economic Council to bring agencies together to discuss broadband issues of common interest.

60. This interagency working group is focused on coordinating the country's broadband agenda and has sought input from agencies regarding their broadband programs to this end. The formation of this group gives expert staff in different federal agencies an unprecedented opportunity to meet, discuss, and coordinate complementary federal broadband programs and policies, and prioritize agency actions to avoid wasted resources. Thus far, a significant focus of the group has been on ensuring that the Recovery Act stimulus programs related to broadband are implemented in a coordinated manner. It also facilitated discussions among federal agencies and the submission of information in connection with the development of this Report. The administration should be commended for these efforts. We recommend that the interagency working group continue, devoting special attention as appropriate to enhancing interagency coordination on rural broadband initiatives.¹³⁹ We believe, at a minimum, that such a focus could serve as a vital step in ensuring that federal agencies do not work at cross purposes and form an important component of a national broadband plan.

61. In addition to the interagency working group, we believe that there are additional steps that can be taken to promote interagency coordination. For example, joint hearings, such as those held recently by the NTIA and USDA regarding the Recovery Act's broadband provisions, can help to promote interagency coordination and provide a forum for the public to provide input toward the shaping and implementation of complementary federal programs. Joint hearings may also facilitate federal, Tribal, state, and local cooperation. To that end, we suggest, for example, that the Commission may want to hold joint public meetings or hearings with USDA and NTIA to gain valuable public input regarding their complementary broadband agendas. We further recommend that the Commission and other federal agencies consider developing their own "rural broadband agendas," consistent with the national broadband plan. This agenda could include the agency's pending (and perhaps planned) proceedings affecting rural broadband. The agencies could share these agendas with each other and, to the extent they do not include confidential information, with the public.

2. Additional Coordination

a. Coordination with Tribal Governments

62. It is critical that federal agencies devote increased attention to improving coordination and collaboration with Tribal governments,¹⁴⁰ consortia, and organizations regarding broadband

¹³⁸ See *National Broadband Plan NOI* at paras. 113–22.

¹³⁹ See, e.g., AFBF Comments at 2; NASUCA Comments at 6; NATOA Comments at 5; Nebraska Commission Comments at 5–6; Pennsylvania Comments at 2; USTA Comments at 2; WISPA Comments at 4.

¹⁴⁰ The terms "Tribal Nation," "Indian Tribe[s]," or "Tribes" refer to any Indian or Alaska Native tribe, band, nation, pueblo, village, or community that is acknowledged by the federal government to constitute a governmental entity necessary to enter into a government-to-government relationship with the United States and thereby be eligible for the programs and services established by the United States for Indians. See The Federally Recognized Indian Tribe List Act of 1994, Pub. L. 103-454, 108 Stat. 4791 (1994) (Indian Tribe Act) (requiring the Secretary of the Interior

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deployment in rural Tribal areas.¹⁴¹ Encouraging broadband deployment in these areas presents unique issues.¹⁴² To ensure a truly comprehensive strategy for addressing rural broadband, it is important that the federal government maintain a continuing dialogue with Tribal governments to address these issues. The Commission has taken a series of steps, through regulatory action, the publication of consumer information, and Tribal outreach, to address the lack of communications deployment and subscribership throughout Indian Country. For example, in the *Tribal Policy Statement*, the Commission reaffirmed its recognition of Tribal sovereignty and the trust relationship between the Commission as part of the federal government and Tribal Nations.¹⁴³ This policy statement indicates the Commission values a government-to-government relationship with federally recognized Indian Tribes and Alaska Native communities. Close consultation between the Commission and the Tribes is the Commission's principal means of identifying and working to resolve communication policy issues relevant to Indian Country. The *Tribal Policy Statement* describes the Commission's consultative and trust responsibilities toward the Tribes. It also expresses the Commission's commitment to work cooperatively with Tribal, state, and local governments as well as other federal departments and agencies to address and remedy communication problems in Indian Country, such as low telephone and broadband penetration rates and poor service quality.

63. In addition to the *Tribal Policy Statement*, the Commission created Tribal Land bidding credits to assist those Tribal communities with the greatest need for telecommunications services. The Tribal Land bidding credits provide winning bidders in spectrum auctions that agree to deploy facilities and provide service in certain Tribal areas with a discount on their spectrum.¹⁴⁴ The Commission also established the Indian Telecommunications Initiative (ITI) to help improve telecommunications services on Tribal lands. The ITI seeks to increase telephone subscribership rates on Tribal lands, upgrade the telecommunications infrastructure on those lands, and inform Tribal consumers about the financial support available through federal programs, such as the Universal Service programs.¹⁴⁵ The ITI also

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to publish in the Federal Register an annual list of all Indian Tribes which the Secretary recognizes to be eligible for the special programs and services provided by the United States to Indians because of their status as Indians).

¹⁴¹ See *supra* note 54 (concerning the definition of Indian Country).

¹⁴² For example, Sacred Wind explains that some federal rules and practices fail to recognize the "special characteristics" of Tribal lands. See Sacred Wind Comments at 1–2. Sacred Wind states, for example, that the definition of a rural community for the USDA's RUS Community Connect Grant Program "excludes communities that are not registered as Census Designated Places" and only a handful of the 111 chapters of the Navajo Nation are registered. Sacred Wind further explains that federal law requires environmental and archeological surveys before any federally-financed construction on Tribal lands, even if the lands already have been surveyed or are within utility easements. See Sacred Wind Comments at 2.

¹⁴³ See *Statement of Policy on Establishing a Government-to-Government Relationship with Indian Tribes*, Policy Statement, 16 FCC Rcd 4078 (2000) (*Tribal Policy Statement*).

¹⁴⁴ See *infra* Part VI.C (providing a detailed discussion of Tribal Land bidding credits).

¹⁴⁵ See FCC, ITI, <http://www.fcc.gov/indians/iti.html> (last visited May 19, 2009). Since its inception, ITI has organized informational workshops to provide Tribes and Tribal organizations with information about Commission rules and policies, such as cellular tower siting procedures and broadband deployment that affect the deployment of telecommunications infrastructure and services on Tribal lands. The ITI seeks to offer clear, practical, solution-oriented information the Tribes can use to benefit their communities and enhance their economic and social development regarding deployment and subscribership challenges. In addition, the Commission's Consumer and Governmental Affairs Bureau, through its Liaison to Tribal Governments and the ITI, seeks to: (1) educate and inform Tribes about telecommunications; (2) confer with Tribal representatives about the Commission's rules, regulations, and policies; (3) assist Tribes in networking with each other to develop viable telecommunications systems; and (4) engage in dialogue with Tribes how to overcome about barriers to obtaining telecommunications technologies. The Commission also conducts outreach through various other mechanisms, including publications or advisories tailored specifically to consumers living on Tribal lands, attendance and participation at Tribal

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seeks to promote understanding, cooperation, and trust among Tribal Nations, government agencies, and the communications industry in addressing issues facing Tribal lands. As part of the ITI, Commission staff maintains regular contact with Tribal telecommunications professionals and Tribal representatives. Commission senior officials and other staff also attend and participate in a variety of meetings on telecommunications issues with Tribal officials and representatives.

64. Although much has been done to foster cooperation, collaboration, and communication with Tribal governments, much work remains. Not only are residents of Tribal lands lagging behind the country as a whole in broadband access, but many still do not even have access to voice service;¹⁴⁶ Native American communities have the lowest reported levels of telephone subscribership in the country.¹⁴⁷ Thus, as an initial matter, we suggest that federal agencies consider how to maximize already existing programs to improve coordination with Tribal governments. We also recommend that the Commission consult with Tribal governments pursuant to the *Tribal Policy Statement* in developing its national broadband plan and, in particular, in developing the aspects of that plan that affect broadband deployment and subscribership specifically on Tribal lands. Further, before promulgating any regulation, agencies may want to consider conducting formal consultations with Tribal governments as may be required under Executive Order No. 13175.¹⁴⁸

b. Coordination with State and Local Authorities

65. As part of the nation's rural broadband strategy, we believe that federal agencies should seek to establish an ongoing dialogue with state and local authorities. State and local governments have knowledge unique to their areas. Many states have broadband initiatives, and in some cases, entities are already working to address the broadband needs of unserved and underserved rural areas.¹⁴⁹ A dialogue

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conferences and events, and periodic meetings with Tribal representatives. In response to feedback received directly from the Tribes, the Commission has conducted targeted outreach regarding telecommunications issues of interest to Tribes, such as the Lifeline/Link Up programs and broadband deployment.

¹⁴⁶ See *supra* Part III.B (noting a lack of broadband service on Tribal lands); see also GAO, CHALLENGES TO ASSESSING AND IMPROVING TELECOMMUNICATIONS FOR NATIVE AMERICANS ON TRIBAL LANDS, GAO-06-189, at 10–13 (2006) <http://www.gao.gov/new.items/d06513t.pdf> (2006 GAO TRIBAL LANDS REPORT) (explaining that according to the 2000 census, the telephone subscribership rate for Native American households on Tribal lands in the lower 48 states was 68.6%, while for Alaska Native Villages it was 87.0%—both substantially below the national rate of 97.6%).

¹⁴⁷ See, e.g., *Sacred Wind Communications, Inc. and Qwest Corporation, Joint Petition for Waiver of the Definition of "Study Area" Contained in Part 36, Appendix-Glossary of the Commission's Rules, Sacred Wind Communications, Inc., Related Waivers of Parts 36, 54, and 69 of the Communication's Rules*, CC Docket No. 96-45, Order, 21 FCC Rcd 9227, 9231, para. 9 (2006); see also *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Memorandum Opinion and Order, and Further Notice of Proposed Rulemaking, 15 FCC Rcd 12208, 12217–18, para. 16 (2000) (amending Lifeline and Link-Up assistance rules applicable to eligible residents of Tribal lands, consisting of qualifying low-income consumers living on or near reservations, as defined in 25 C.F.R. § 20.1(r), (v)); *Federal-State Joint Board on Universal Service; Promoting Deployment and Subscribership in Unserved and Underserved Areas, Including Tribal and Insular Areas*, CC Docket No. 96-45, Order and Further Notice of Proposed Rulemaking, 15 FCC Rcd 17122 (2000) (seeking additional comment on extending the enhanced Lifeline and Link-Up measures to qualifying low-income consumers living in areas near reservations to target support to underserved, geographically isolated, and impoverished areas that are characterized by low subscribership).

¹⁴⁸ Consultation and Coordination with Indian Tribal Governments, Exec. Order No. 13175, 65 Fed. Reg. 67249 (Nov. 9, 2000).

¹⁴⁹ See *infra* Part V.B (discussing state initiatives regarding mapping and data collection); see also Massachusetts Commission Comments at 4–5; Michigan Commission Comments at 5; NGA CTR. FOR BEST PRACTICES, STATE EFFORTS TO EXPAND BROADBAND ACCESS 4 (2008), <http://www.nga.org/Files/pdf/>

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among state and local entities and federal agencies enables state and local governments to gain valuable information concerning federal resources and initiatives. At the same time, federal-state coordination allows the federal government access to the states' valuable knowledge and experience,¹⁵⁰ helps inform the federal government in establishing rural broadband policies and initiatives, and prevents wasted time and resources from duplicating states' efforts.

66. When the Commission is fully constituted, we recommend that the states take full advantage of existing mechanisms for coordination, such as the Joint Conference on Advanced Services.¹⁵¹ We further recommend that the Joint Conference provide the Commission with its own recommendations for improving federal coordination with states regarding rural broadband deployment.¹⁵² We understand that the state members of the Joint Conference have already begun the process of compiling an inventory of "best practices" and successful state and local projects as an aid to industry, consumers, and fellow governmental entities.¹⁵³ We recommend that the Joint Conference continue this program. We further suggest that the government at all levels work to develop an inventory of resources, "best practices," and success stories to inspire and motivate others to undertake the difficult but ultimately rewarding task of bringing broadband to rural communities across this nation. Finally, we also recommend that the Joint Conference include in its recommendations suggested proposals to address and ameliorate the unique challenges presented to rural minority communities, rural low-income communities, and persons with disabilities residing in rural areas.

c. Coordination with Communities

67. Our goal of ubiquitous, affordable, and robust broadband for all will be achieved faster and more easily when everyone involved has access to the essential information and resources necessary to make informed decisions. Thus, in order to be successful in coordinating existing federal programs concerning rural broadband or rural initiatives, it is critical that the federal government collaborate and

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0805BROADBANDACCESS.PDF (NGA, STATE EFFORTS TO EXPAND BROADBAND) (explaining that California, Missouri, Hawaii, and Maryland have used state task forces to evaluate the current state of broadband deployment and identify possible regulatory changes to increase service availability in their states).

¹⁵⁰ For example, the Commonwealth of Virginia's Office of Telework and Broadband Assistance has produced a community guidebook or "toolkit" containing specific tools and resources that communities can leverage when they are assessing how to deploy broadband in their communities. *See, e.g.,* Virginia.gov, Office of Telework Promotion and Broadband Assistance, Community Broadband Toolkit, http://www.otpba.vi.virginia.gov/roundtable_toolkit.shtml (last visited May 19, 2009) (Virginia.gov Toolkit); *see also* Karen Jackson, Director of the Telework Promotion and Broadband Access for the Commonwealth of Virginia, Address at the National Governors Association: State Efforts to Expand Broadband Access (Dec. 18, 2008), (transcript available at <http://www.apf.org/events/2008/1218broadband.txt> (last visited May 19, 2009)) (describing the efforts of the Commonwealth of Virginia's Center for Innovative Technology, and addressing related broadband issues such as "broadband-friendly zoning," along with expediting the permitting process and waiving or reducing fees, as well as mapping and engaging local communities).

¹⁵¹ The Joint Conference serves as a forum for an ongoing dialogue among the Commission, state regulators, and local and regional entities regarding the deployment of advanced telecommunications capabilities. It was convened in 1999 as an early step in the Commission's efforts to ensure that advanced services are deployed as rapidly as possible to all Americans, and reconstituted by the Commission on March 19, 2008. *See Commission Seeks Nominations for Federal-State Joint Conference on Advanced Services*, CC Docket No. 99-294, News Release (rel. Mar. 19, 2008); *Federal-State Joint Conference on Advanced Telecommunications Services*, CC Docket No. 99-294, Order, 14 FCC Rcd 17622 (1999). The Joint Conference is comprised of commissioners from state public utilities commissions and from the Commission, and is chaired by the Commission Chairman or his designee.

¹⁵² 2008 Farm Bill § 6112(a)(1)(C).

¹⁵³ Joint Conference Comments at 5.

coordinate with community and advocacy organizations in rural areas. The federal government should work closely with these organizations to help ensure that all minority group members residing in rural areas have access to robust and affordable broadband services and that minority-owned businesses participate fully in the buildout of broadband infrastructure in those areas. The federal government also should work closely with organizations representing persons with disabilities to help ensure that they have affordable access to broadband services capable of supporting the full array of applications responsive to their needs. Finally, the federal government should work closely with organizations that serve low-income residents to ensure the opportunities that affordable broadband offers this community do not go unrealized.

68. We know that community and local advocacy groups are an essential component to the success of deploying broadband in rural areas.¹⁵⁴ Further, public-private partnerships can play a critical role in bringing broadband to rural areas.¹⁵⁵ Community and advocacy groups and public-private partnerships can function as valuable information sources for local communities, businesses, and consumers in rural areas, and various groups have developed guidance on how to deploy broadband in those areas. For example, the Commonwealth of Virginia has produced an online “Community Broadband Tool-Kit” that provides step-by-step guidance on how a community can deploy broadband services.¹⁵⁶ This tool-kit has information on broadband applications and case-studies from Virginia localities that have successfully deployed broadband facilities. Another group, called Connecting Rural Communities, publishes a guidebook that explains in detail how to bring broadband services to rural communities.¹⁵⁷ The Michigan Department of Information Technology has released its own “Action Plan for Deploying Broadband Internet to Michigan Local Governments,” which similarly details how developing goals is essential for building a broadband network.¹⁵⁸

¹⁵⁴ Connected Nation Comments at 13.

¹⁵⁵ The key to many success stories was the formation of a core local group or team comprised of individuals from both the public and private sectors. For example, a local businessman who partnered with the community and local government succeeded in bringing to Stevenson, Washington, a municipality with a population of 1,300, a Wi-Fi network that blankets the entire downtown area. *See, e.g.*, City of Stevenson, Washington, Wi-Fi Project, <http://www.cityofstevenson.com/wifi.html> (last visited May 19, 2009). The Blacksburg Electronic Village, an online community center serving the needs of a diverse population, began with a collaboration among the Town of Blacksburg, Virginia Tech, Bell Atlantic (now Verizon), and other interested members of the community. *See* Blacksburg Electronic Village, <http://www.bev.net/> (last visited May 19, 2009). In addition, Connected Nation’s local leadership teams, comprised of community leaders from key sectors such as healthcare, education, security, and the local private and public sectors, were integral in creating a large public wireless broadband project in a very rural area, the Green River Area Development District of Kentucky. Connected Nation Comments at 13.

¹⁵⁶ *See* Virginia.gov Toolkit, http://www.otpba.vi.virginia.gov/roundtable_toolkit.shtml.

¹⁵⁷ The Connecting Rural Communities project was developed by the Penn State University and University of Minnesota Extension and was funded by the Southern Rural Development Center/Mississippi State University, in partnership with Cooperative State Research, Education, and Extension Service (CSREES)/USDA, as part of “The Rural e-Commerce Extension Initiative: A National Demonstration Project.” *See* Connecting Rural Communities, Welcome to Connecting Rural Communities, <http://www.connectingcommunities.info/index.cfm> (last visited Apr. 29, 2009). This guidebook simplifies the process to several discrete steps: (1) create a team, either an individual or small group, that realizes how connectivity can help future economic and social well-being; (2) learn about broadband; (3) assess what one has, such as what infrastructure and people skills one already has in the community; (4) design a network that can accommodate future growth; (5) create an action plan; (6) implement and evaluate; and (7) tell the story. *See* Connecting Rural Communities, Getting Started, <http://www.connectingcommunities.info/article.cfm?id=198> (last visited Apr. 29, 2009).

¹⁵⁸ *See* MICH. DEP’T OF INFO. TECH., ACTION PLAN FOR DEPLOYING BROADBAND INTERNET TO MICHIGAN LOCAL GOVERNMENTS, http://www.michigan.gov/documents/dit/Broadband_Reference_Guidebook_FINAL_212166_7.pdf (last visited May 19, 2009).

69. The federal government should collaborate with these organizations and ones like them to fully understand the challenges in deploying broadband in rural areas and develop solutions that overcome those challenges. We suggest that the federal government continue to take a leadership role alongside individuals, groups, businesses and other governmental organizations seeking to fit together all the pieces needed to bring state-of-the-art broadband services to rural areas.

B. Streamlining, Improving, and Coordinating Existing Federal Programs

70. Given the numerous federal programs currently addressing rural broadband, it is critical that those programs function efficiently and effectively to maximize consumer benefits. With so many programs addressing mostly complementary, but occasionally overlapping, aspects of rural broadband deployment there is the risk of duplication of effort and inefficient use of government resources. Given this, all relevant federal agencies should review their programs to identify what internal barriers, if any, may be making rural broadband deployment more difficult. Further, all federal agencies with responsibility for rural issues may wish to consider the need and opportunity for rural broadband deployment in designing their programs, as well as how their programs support the ability of minority-owned and small or disadvantaged businesses to employ broadband services. We note that all federal agencies have an opportunity to learn from the grantees and recipients of RUS and NTIA broadband funds and should identify the business models most successful in rural areas.¹⁵⁹

71. In addition to these overarching strategic elements to streamline and improve existing federal programs, we believe that there are additional specific considerations that should be taken into account. We discuss some of these considerations below.

1. Efficient Use of Government Funds and Resources

72. We recommend that federal agencies review their non-broadband programs regarding rural issues to see if those programs provide opportunities to promote rural broadband deployment. For example, given that one of the largest deployment costs of underground fiber networks is the expense associated with digging the trenches to lay the fiber, some commenters suggest that costs of those networks could be reduced if fiber could be installed at a time when roads are already being constructed or repaired. Thus, these commenters suggest that agencies responsible for road construction or repair should consider how these projects can be used to facilitate broadband deployment in rural areas.¹⁶⁰ In addition, relevant agencies could consider offering collocation space in federally-owned buildings to rural broadband providers that wish to interconnect with broadband facilities terminating in those buildings,¹⁶¹ developing expedited procedures for granting rights of way on public lands for broadband projects,¹⁶² or wiring government-supported housing for broadband.¹⁶³ We also suggest federal agencies consider how existing federal programs and resources can be maximized to spur rural broadband deployment.

¹⁵⁹ See, e.g., Lone Eagle Consulting Comments at 2 (suggesting the creation of an Office of Broadband Innovation Best Practices to focus on the identification and dissemination of best practices as they emerge); see also *supra* Part IV.A.2 (discussing coordination with state and local authorities).

¹⁶⁰ See, e.g., NMMLP Comments at 1; Mimi Pickering Comments at 1–2; Rural Broadband Policy Group Comments at 7; Pennsylvania Comments at 6; New America Foundation Comments, Attach. at 3; see also Broadband Conduit Deployment Act of 2009, H.R. 2428, 111th Cong. § 2 (2009) (requiring the installation of broadband conduit in highway construction projects).

¹⁶¹ See Benton Foundation Comments, Attach. A at 4.

¹⁶² See Access Humboldt Comments at 3; CTEF Comments at 1.

¹⁶³ See, e.g., ONE ECONOMY CORPORATION, ANNUAL REPORT 2007, at 4, available at <http://www.one-economy.com/sites/all/files/report2007-low-res.pdf> (last visited May 14, 2009) (stating that One Economy has

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2. Coordinating Program Criteria

73. Federal agencies involved in rural broadband initiatives should consider coordinating key terminology, such as the term “rural,” across their programs, consistent with their legislative mandates.¹⁶⁴ Dissimilar definitions and criteria across complementary programs can complicate the flow of funds to rural broadband users and hinder federal interagency coordination. Coordinating key terminology across related programs will help to ensure that federal programs work consistently and in concert with one another.

3. Government Websites

74. One of the challenges to rural broadband deployment and adoption is a lack of easy public access to comprehensive information about all the government resources available to help communities and individuals obtain access to broadband services. Although the federal agencies involved have attempted, under great time pressures, to publicize and educate the public about the programs implementing the Recovery Act, other broadband-related programs exist that would benefit from the same type of information dissemination. Further, the public would benefit enormously from the availability of one access point that serves as a central repository for information about all federal programs addressing rural broadband deployment. Consequently, to improve the efficiency and effectiveness of federal broadband initiatives and programs, and enable the public to take full advantage of available federal resources, we recommend the Commission, in coordination with other federal agencies, consider the development of a comprehensive website that will provide a centralized access portal for information concerning all federal programs addressing broadband.¹⁶⁵

75. In the meantime, as an aid in these efforts, we recommend that the Commission expand its website to include a comprehensive set of links to all federal government rural broadband-related programs.¹⁶⁶ The Commission and USDA have already taken some preliminary steps toward this end. In 2005, the Commission’s Wireless Telecommunications Bureau and RUS created the Joint Federal Rural Wireless Outreach Initiative to coordinate activities and essential information on programs and financial and other assistance regarding telecommunications opportunities for rural communities. This initiative seeks to encourage greater access and deployment of wireless services to enhance economic development throughout rural America. Since February 2008, the Commission and USDA have launched the “Broadband Opportunities for Rural America” website and held four regional educational workshops on rural broadband.¹⁶⁷ The website is designed to provide those in rural America looking to bring the benefits of broadband services to their communities with the expertise and resources of the Commission

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worked to change the affordable housing finance policies in 42 states to foster the inclusion of affordable broadband into the homes of low-income individuals).

¹⁶⁴ See John Cromartie & Shawn Bucholtz, *Defining the “Rural” in Rural America*, 28 AMBER WAVES 28, 29 (2008), available at <http://www.ers.usda.gov/AmberWaves/June08/Features/RuralAmerica.htm> (stating that there are more than two dozen rural definitions currently used by Federal agencies); see also, e.g., AT&T Comments at 2–3; NCTA Comments at 7–8; NRTC Comments at 8; Nebraska Commission Comments at 4; SBA Comments at 7; WISPA Comments at 5.

¹⁶⁵ See *National Broadband Plan NOI* at paras. 116–18.

¹⁶⁶ See 2008 Farm Bill § 6112(a)(2).

¹⁶⁷ The workshops provide communities and organizations in rural America seeking to bring the benefits of broadband to their communities with an opportunity to learn about the resources, programs, and policies of the Commission and USDA. *FCC and USDA to Conduct Regional Educational Workshops on Rural Broadband During 2008*, Public Notice, 23 FCC Rcd 1263 (2008).

and USDA in a single, easily-accessible location and user-friendly format.¹⁶⁸ We propose that the existing “Broadband Opportunities for Rural America” website be expanded to include a comprehensive list of all federal government programs related to rural broadband. This list could later be incorporated in, or linked to, a central website.

4. Delay Caused by Other Federal Requirements

76. The 2008 Farm Bill directs that this Report recommend ways to “address short- and long-term needs assessments and solutions for a rapid build-out of rural broadband solutions”¹⁶⁹ and “identify how specific Federal agency programs can best . . . overcome obstacles that currently impede rural broadband deployment.”¹⁷⁰ Meeting the goal of rapid deployment of broadband to rural areas will require federal agencies not only to resolve numerous issues, but also to implement their decisions quickly. We recommend that federal agencies having responsibility for addressing rural broadband matters consider reviewing their rules, regulations, or other requirements to identify those that might impede quick implementation of rural broadband. Agencies also might consider whether any of their routine processes or functions could be streamlined when rural broadband deployment is implicated.

V. ASSESSING RURAL BROADBAND NEEDS

77. While the Commission and USDA, as well as other federal, Tribal, state, and local government agencies have made efforts in recent years to address the lack of broadband in rural areas—through funding programs, regulatory actions, and outreach and data gathering initiatives—the need for rural broadband remains. The 2008 Farm Bill directs that this Report include recommendations “to address both short- and long-term needs assessments and solutions for a rapid buildout of rural broadband solutions and application of the recommendations for Federal, State, regional, and local government policymakers.”¹⁷¹ We set forth below our analysis of the most common problems that have been brought to our attention. We discuss activity to date with respect to each issue and offer recommendations.

A. Technological Considerations

78. The number and range of technological solutions available to speed the deployment of affordable broadband in rural areas is increasing. As in other parts of the country, a number of technologies are available to provide the various components of broadband access in rural areas.¹⁷² Each technology has specific cost and performance attributes that, coupled with compatibility and appropriateness of existing infrastructures and demand expectations, have an impact on its suitability for

¹⁶⁸ *FCC and USDA Launch Web Site Focused on Rural Broadband Opportunities*, News Release, FCC, Feb. 1, 2008. The site provides information on the different technology platforms that can be used to provide broadband service, how to access spectrum necessary for delivery of wireless broadband services, government funding for broadband services, relevant Commission and USDA proceedings and initiatives, including the programs and initiatives created as a result of the recent broadband legislation, and data on broadband deployment. In addition, the site provides instructions on how to locate companies already licensed to provide wireless services in or near specific rural communities, as well as helpful links to other government and private resources related to encouraging broadband opportunities in rural America. *Id.*

¹⁶⁹ 2008 Farm Bill § 6112(a)(1)(C).

¹⁷⁰ *Id.* § 6112(a)(1)(D).

¹⁷¹ *Id.* § 6112(a)(1)(C).

¹⁷² These include “wired” technologies, using fiber, coaxial cable, copper wires, or BPL; a variety of terrestrial wireless technologies; and also satellite technologies.

deployment in a particular rural area.¹⁷³ In particular, the introduction of new technologies and broadband deployment approaches increasingly enables providers using wireless, wireline, or satellite-based networks, or a combination thereof, to realize significant savings. This is particularly true with respect to providers building new networks in previously unserved rural areas.¹⁷⁴ Nevertheless, every technology has inherent capabilities and limitations. Those characteristics vary greatly among technologies. Similarly, every rural area presents its own special challenges, and a particular technological solution may be well-suited to one situation and poorly-suited to another. Therefore, decision makers should proceed on a technology-neutral basis—by considering the attributes of all potential technologies—in selecting the technology or technologies to be deployed in a particular rural area.

79. Rural broadband networks are fundamentally similar to broadband networks in other areas in that, in order to have broadband access to the Internet, they must include local access, or last-mile, broadband access to the end user and backhaul, or middle-mile, capabilities to an available Internet peering point. The last-mile network connects residential and business end users to a local ISP. In this configuration, the middle-mile or backhaul component connects the local ISP to an Internet peering point or node.¹⁷⁵ In rural settings, either or both of these components may not support robust broadband connectivity.¹⁷⁶ The choice of any local access or “middle-mile” technology in a rural setting must take into account factors including desired capacity, cost, reach, and the need for additional resources like radiofrequency spectrum, electronic equipment, access to poles and rights of way, and power.

80. The best choice for any particular area in all likelihood will reflect, in addition to the population density and terrain of the area, the capabilities and limitations of the technology or technologies under consideration. The technology choice should take into account the ability of each feasible solution to provide cost-effective broadband connectivity in a given area based on consistent, high-quality performance that ideally will be capable of evolving over time to meet the growing requirements of Internet access and may well combine a variety of wireline and wireless elements. Some of the technology issues to consider are discussed below.

81. *Latency.* Latency is the time delay from when an end user sends a signal to the moment that the signal reaches its intended destination and vice versa. It is relevant in all parts of the network. Network technologies that create significant time delay can arguably degrade the performance of many

¹⁷³ We also note that there are a wide variety of broadband applications requiring different functionalities. Some of the next-generation broadband applications require functionalities such as, for example, dramatically faster file transfer speeds for both uploads and downloads, and the ability to transmit streaming video. See INFORMATION TECHNOLOGY & INNOVATION FOUNDATION, THE NEED FOR SPEED: THE IMPORTANCE OF NEXT-GENERATION BROADBAND NETWORKS (March 5, 2009), available at <http://www.itif.org/files/2009-slides-needforspeed.pdf> (last visited Apr. 30, 2009).

¹⁷⁴ See generally Letter from Michele C. Farquhar, Counsel, LEMKO Corporation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 09-29 (filed Apr. 16, 2009) (describing advanced wireless network architectures for rural deployments); see also Letter from Thomas Cohen, Counsel, Calix, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 09-29 (filed Apr. 7, 2009) (describing new approaches to fiber deployments, particularly in rural areas).

¹⁷⁵ Rural broadband networks are typically in locations that are geographically removed from Internet peering points or nodes. As a consequence, there may be no dedicated, high-capacity middle-mile line available to connect the local ISP with a peering point, and a rural ISP may therefore not be capable of providing robust broadband Internet access to its customers. See NECA Comments at 5–6 (finding that 55% of rural telephone companies are located more than 70 miles from a node and 10% are more than 200 miles away).

¹⁷⁶ See DigitalBridge Comments (“The lack of middle-mile infrastructure is one of the greatest obstacles to building sustainable rural broadband networks. Many middle-mile facilities were originally built by telephone and cable companies for ordinary telecommunications or cable television services. Rural communities are often still reliant upon these antiquated copper telephone and cable infrastructures, which lack the capabilities to deliver high-speed, broadband access.”).

interactive Internet applications.¹⁷⁷ The extent of the degradation increases with the extent of the delay. Latency is particularly important for voice applications such as VoIP¹⁷⁸ and Video Relay Service (VRS)¹⁷⁹ where a high degree of latency can degrade voice communication to an unintelligible level. Other non-voice, interactive Internet applications may also be less tolerant of the effects of latency. These include some educational applications,¹⁸⁰ some telework applications,¹⁸¹ telepresence,¹⁸² many telemedicine applications,¹⁸³ and interactive online gaming.¹⁸⁴ We note that these industries currently represent only a small portion of total Internet traffic.¹⁸⁵ However, all are burgeoning and have the potential to employ thousands of Americans and generate tremendous economic activity.¹⁸⁶ Latency therefore should be important in considering the best options for rural America.

¹⁷⁷ See Letter from Stephen L. Goodman, Counsel, ADTRAN, Inc., to Marlene H. Dortch, Secretary, FCC, WC Docket No. 09-40, app.1 at 3 (filed Apr. 13, 2009) (discussing allowable latency requirements for networks to retain an interactive experience for applications) (ADTRAN April 13, 2009 *Ex Parte* Letter); STUART CHESHIRE, VOLPE, WELTY, ASSET MGMT, LLC, LATENCY AND THE QUEST FOR INTERACTIVITY (Nov. 1996) (finding in 1996 that a signal can move through the Internet backbone from Stanford to Boston and back in less than 80 milliseconds (ms) and discussing theoretical speeds as a matter of physics), <http://www.stuartcheshire.org/papers/LatencyQuest.html>, cited in ADTRAN April 13, 2009 *Ex Parte* Letter, app. 1 at 6 n.5. See also Letter from C. Douglas Jarrett, Counsel, API, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 09-51 at 1 (filed May 12, 2009) (stating that the petroleum industry needs “more robust broadband infrastructure . . . in rural areas” and that “the industry’s operational/critical infrastructure industry requirements” “operate most efficiently with a maximum latency of 20 ms, and that latency approximating 100 ms adversely impacts these applications”).

¹⁷⁸ Interconnected VoIP providers made \$514 million in 2006, the first year that the Commission has data for that type of provider. See 2008 TRENDS IN TELEPHONE at tbl. 15.4.

¹⁷⁹ VRS is a form of telecommunications relay service that allows individuals with a hearing disability to communicate with voice telephone users using sign language that is transmitted through video equipment connected to a broadband Internet connection. The video link allows a relay agent to view and interpret the user’s signed conversation and relay the conversation back and forth with a voice telephone user. See 47 C.F.R. 64.601(a)(26); see generally 47 C.F.R. 64.601 *et seq.*

¹⁸⁰ Educational industries have emerged that are capable of supplying interactive educational experiences, such as for music lessons, over broadband connections. See, e.g., Internet2, Internet2 Member Community Education Initiatives, <http://www.internet2.edu/arts/member-education.html> (last visited May 20, 2009).

¹⁸¹ See, e.g., Cisco, WebEx, How it Works for Meetings, <http://www.webex.com/how-it-works/for-meetings.html> (last visited Apr. 23, 2009) (describing interactive video conferencing that allows users to share files virtually, show presentations, mutually browse, and record the meeting, among other features).

¹⁸² Youtube, Cisco Telepresence Magic, http://www.youtube.com/watch?v=rcfNC_x0VvE (last visited Apr. 23, 2009) (demonstrating telepresence and claiming \$1 billion in sales in 3 years for this “green” product).

¹⁸³ See, e.g., American Telemedicine Association, Home Telehealth & Remote Monitoring SIG, <http://www.americantelemed.org/i4a/pages/index.cfm?pageID=3320> (last visited Apr. 24, 2009) (discussing its home telemonitoring program and providing links that list various abstracts of peer reviewed articles involving interactive home telemedicine applications).

¹⁸⁴ Interactive online gaming is a billion dollar per year industry for one American-based video game developer alone. Seth Schiesel, *An Online Game, Made in America, Seizes the Globe*, N.Y. TIMES, Sept. 5, 2006, at A1 (noting that Blizzard Entertainment, Inc. made over \$1 billion the previous year mostly for ongoing subscriptions from the interactive massive multiplayer online game, World of Warcraft). See also Alex Pham, *The Work of Play: Video Games Grow Up*, L.A. TIMES, Oct. 19, 2008 (reporting that interactive online gaming is expected to make \$8 billion over the next ten years and that the video game industry employs thousands in California); Hiawatha Bray, *Computer vs. The Console: Downloads Give PC Games a Boost Battle for Buyers*, BOSTON GLOBE, Jun. 17, 2008.

¹⁸⁵ See CISCO SYSTEMS, INC., CISCO VISUAL NETWORKING INDEX—FORECAST AND METHODOLOGY, 2007–2012, at 4, tbl. 3 (2008), http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360.pdf (last visited May 15, 2009).

¹⁸⁶ See, e.g., *supra* notes 178–184 (discussing current and emerging revenue-generating network applications).

82. *Scalability.* Some technologies are easier to upgrade than others. An amply sized conduit can be filled with more cables to increase capacity; a conduit that is too small has to be supplemented with a new conduit to increase capacity. Fiber networks can easily be upgraded by swapping out the optoelectronic equipment. Copper broadband loops may be capable of economically feasible upgrades with new network and consumer premises equipment. Certain wireless networks can be upgraded with the latest technology through the relatively simple replacement of the network's software cards rather than the entire cell sites. In addition, an existing, multi-use radio tower may be able to support additional wireless infrastructure that helps provide new services, improve coverage, and increase the bit rate and efficiency of spectrum usage. Remote software upgrades are easier to accomplish than corresponding hardware upgrades, particularly in remote areas. Given the high fixed costs of constructing broadband networks, once built, they are not likely to be replaced, especially in rural areas that are unserved today. As a consequence, we believe that networks deployed in rural areas should not merely be adequate for current bandwidth demands. Instead, they also should be readily upgradeable to meet bandwidth demands of the future. An international comparison suggests significant additional capacity may be necessary. For example, while the average download speed for residential broadband subscribers in the United States is currently 2.3 Mbps, residential subscribers in Japan now average 63 Mbps.¹⁸⁷ Moreover, service providers in Hong Kong, Japan, South Korea, and Singapore either offer 1 Gbps residential service now or are planning to have comprehensive 1 Gbps residential service in the near future,¹⁸⁸ and South Korea is complementing its fiber rollout with 10 Mbps wireless 4G services for mobility.¹⁸⁹ Bandwidth-intensive applications could very quickly become the norm in the U.S.—even in rural areas. Technologies that cannot be upgraded easily could make Internet applications less than five years from now look like the dial-up downloads of today.

83. *Weather and Environmental Conditions.* Unfavorable weather and environmental conditions can affect transmission technologies. Rain, snow, extreme temperatures, salt, pollution, and wind can degrade some technologies' broadband performance or even render a technology unusable until the conditions change. However, these weather conditions are considered in the design phase of each system, and service outages are typically very limited in duration, on the order of a few minutes or less per month.¹⁹⁰ Technologies that are adversely affected by typical weather conditions are less useful than

¹⁸⁷ See ROBERT D. ATKINSON *et al.*, INFO. TECH. & INNOVATION FOUND., EXPLAINING INTERNATIONAL BROADBAND LEADERSHIP app. D at D1, D3 n.5 (May 2008), <http://www.itif.org/files/ExplainingBBLeadership.pdf> (last visited May 19, 2009) (providing the average data speeds for Japan based on advertised speeds of several major carriers in the country).

¹⁸⁸ See Amit Roy Choudhury, *Platform for Next Level of Growth: The Next Generation National Broadband Network Will Change the Way Singaporeans Work, Play and Live*, BUS. TIMES. (SINGAPORE), Mar. 30, 2009 (discussing Singapore's plans to have 100 Mbps to 95% of homes and businesses by 2012 with consideration to upgrade to 1 Gbps shortly thereafter); BBC Monitoring Service, *South Korea: Super-Speed Internet Planned by 2012*, BBC INT'L REP. (MEDIA), Feb. 2, 2009 (reporting that South Korea has committed to have 1 Gbps to the home with 10 Mbps wireless overlay by 2012); Richard Mumford, *RF and Microwaves in Asia: Economies of Scale*, 51 MICROWAVE J., INT'L ED. 118 (2008) (noting that Japan and Hong Kong already have 1 Gbps services to many homes and that South Korea is not far behind); see also Leslie Cauley, *FCC Pursues Goal of a Nationwide Affordable, Fast Internet*, USA TODAY, Apr. 8, 2009, at 5B (noting that Australia recently committed to 100 Mbps nationwide).

¹⁸⁹ *Korea to get 1Gbps Wired Internet by 2012*, ELECTRONISTA, Feb. 2, 2009, <http://www.electronista.com/articles/09/02/02/korea.to.get.1gbps.web/> (last visited May 15, 2009); see also Sung So-young, *IT Plan Calls for Big Spending, Jobs*, JOONGANG DAILY, Feb. 2, 2009, <http://joongangdaily.joins.com/article/view.asp?aid=2900490>.

¹⁹⁰ The International Telecommunication Union has published many recommendations concerning the availability and performance of various wireless services such as the fixed and mobile services, as well as satellite services. For example, ITU-R Recommendation F.1400 provides information on the performance and availability requirements

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alternatives that are not affected by weather.¹⁹¹

84. *Survivability, Redundancy, and Security.* As noted, investment in rural technologies will be for the long term. Ideally, decision makers should consider the survivability of the technology under adverse conditions. Extreme weather conditions can damage broadband infrastructure and could be especially devastating to the extent that a rural area might not have the resources to repair broadband facilities disrupted over a wide region. Disasters such as Hurricane Katrina have shown that infrastructure that is vulnerable to adverse weather events can leave large numbers of people without critical communications capability for long periods of time.¹⁹² Overall economics should be balanced with planning to ensure that critical facilities supporting large numbers of subscribers are adequately protected from foreseeable weather events. Middle mile and backhaul facilities specifically should be capable of surviving harsh environments and foreseeable disaster events. However, this may be difficult in rural environments. For example, there may be only a single right of way, making implementation of diverse strategies difficult. In such instances, hardening of critical facilities, *e.g.*, trenching fiber to a depth of 3 feet or more, may be an alternative in building critical infrastructure. Moreover, all technologies present security concerns. America's future broadband network will be used for everything from our electrical grid to our emergency systems and will require infrastructure that is secure at every step.¹⁹³

85. *Distance and Topography.* How well a technology performs over extended distances and in the context of the local topography could be a critical factor in many rural areas. For instance, because some wireless technologies need uninterrupted lines of sight between nodes, terrain can block the proper transmission of signals: a technology that works well on an open plain may not be appropriate if mountains or dense forests occupy a significant portion of the transmission route. In addition, wireless signals using frequency bands below 1 GHz generally penetrate environmental obstructions better than signals using higher bands, making the lower-band technologies particularly well-suited for rural deployment.¹⁹⁴ Furthermore, wireless technologies that rely on additional infrastructure, such as a series

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and objectives for fixed wireless access to the public switched telephone network. ITU-R Recommendation S.1783 provides similar data for the satellites. There are numerous other Recommendations available for each service.

¹⁹¹ See Kodiak-Kenai Cable Comments at 3–4 (discussing satellite's frequent service disruptions as justification for building the "all weather" Northern Fiber Link); JOHN S. SEYBOLD, INTRODUCTION TO RF PROPAGATION 257 (2005) (discussing satellite rain fade and rain attenuation); SAMI TABBANE, HANDBOOK OF MOBILE RADIO NETWORKS 32 (2000) (discussing how wireless technologies are affected by rain).

¹⁹² See SELECT BIPARTISAN COMMITTEE TO INVESTIGATE THE PREPARATION FOR AND RESPONSE TO HURRICANE KATRINA, US HOUSE OF REPRESENTATIVES, A FAILURE OF INITIATIVE: THE FINAL REPORT OF THE SELECT BIPARTISAN COMMITTEE TO INVESTIGATE THE PREPARATION FOR AND RESPONSE TO HURRICANE KATRINA (Feb. 15, 2006), http://katrina.house.gov/full_katrina_report.htm (noting that Katrina's destruction of pole mounted backhaul facilities was a major contributing factor to the long-term disruption of communications in the wake of that hurricane).

¹⁹³ See, *e.g.*, Ellen Nakashima & R. Jeffrey Smith, *Electric Utilities May Be Vulnerable to Cyberattack*, WASH. POST, Apr. 9, 2009, at A4.

¹⁹⁴ JOHN S. SEYBOLD, INTRODUCTION TO RF PROPAGATION 2, 6 (2005). See Valerie Fast Horse Comments at 3 (urging the Commission to allow the use of new low-frequency spectrum that can penetrate trees and make non-line-of-site communication possible). For example, as compared to providing service at higher frequencies, the unique propagation characteristics of the 700 MHz band mean that fewer towers will be needed to serve a given license area, thereby lowering infrastructure costs. See *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands; Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems; Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones; Biennial Regulatory Review—Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services; Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part* (continued....)

of repeaters or amplifiers, to regenerate a signal over long distances may not be appropriate in some settings. Wireline technologies typically require poles or trenches for deployment, which may be more costly in areas of permafrost and rocky terrain.

86. *Maintenance and Repair.* Some technologies are more expensive to maintain and repair than others. All structures eventually deteriorate over time, but some materials and technologies are naturally more durable than others. Because sustainability is a serious consideration for many rural areas, the lower the maintenance and repair costs, the more likely the technology will prove to be cost-effective over time. For example, optical technology, because of its lack of outside plant electronics, relative immunity to moisture, and sophisticated diagnostic capabilities, offers significant maintenance advantages.

87. *Resource Contention and “Micro-Congestion.”* Some technologies operate on a shared last-mile platform and some offer dedicated last-mile capacity. Shared technologies often provide greater peak performance than dedicated technologies. However, when the access network is congested, the performance an individual user experiences on a shared-technology network can be significantly worse than that over a dedicated last-mile network. When comparing the speed of broadband access networks, it is important to consider peak performance, typical performance, and minimum performance. Resource contention may also exist in the backhaul or middle-mile portions of the network. Moreover, some technologies are more susceptible to “micro-congestion” or “jitter,” which occurs “whenever a large number of packets come from a faster network link to a slower network link or where several networks links merge to a single link.”¹⁹⁵ High jitter can make use of interactive applications difficult.¹⁹⁶

B. Assessment of Broadband Deployment

1. Broadband Data Collection

88. As recognized above,¹⁹⁷ we do not have comprehensive and reliable data on the extent of broadband availability and subscribership in rural areas. Nor do we have sufficient information on rural broadband demand, transfer speeds, and prices, or on the infrastructure available to help provide broadband services to unserved and underserved rural areas. This lack of information constitutes a significant challenge to ubiquitous and robust broadband deployment in rural areas.¹⁹⁸ Policymakers, entrepreneurs, community groups, and consumers all need accurate information in these information categories in order to make informed decisions. We recommend that the Commission work to collect this

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27 of the Commission’s Rules; Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, WT Docket Nos. 06-150, 96-86, 03-264, 01-309, 06-169, CC Docket No. 94-102, PS Docket No. 06-229, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8064 (2007) (*700 MHz Report and Order*); Second Report and Order, 22 FCC Rcd 15289, 15348, para. 154 (2007), *recon. pending (700 MHz Second Report and Order)*.

¹⁹⁵ See GEORGE OU, THE INFORMATION TECHNOLOGY AND INNOVATION FOUNDATION, MANAGING BROADBAND NETWORKS: A POLICYMAKER’S GUIDE 10 (2008).

¹⁹⁶ See *id.*

¹⁹⁷ See *supra* Part III.B (discussing the current dearth of data regarding the state of broadband in America).

¹⁹⁸ ACS Comments at 4; Connected Nation Comments at 4 (“[I]dentifying and mapping unserved and underserved areas—is a necessary factual guide for any rural broadband strategy.”); NASUCA Comments at 5 (“Another key to a national rural broadband strategy is knowing where broadband service is available, and at what speeds and at what prices.”); NATOA Comments at 6.

information, in coordination with the administration and Tribal and state governments. We provide a brief overview of each of these information categories below.

89. *Availability and Subscribership.* Determining the extent to which broadband service is available in rural areas, and the extent to which consumers and businesses subscribe in areas where it is offered, are key elements of assessing broadband needs and deployment. Data collected for smaller geographic areas and for discrete population subgroups, such as Tribal Nations, minority groups, and persons with disabilities, are generally more informative than data collected for larger areas or groups. In addition, provider-specific and technology-specific data on broadband availability and subscribership would help policymakers evaluate issues such as the level of broadband competition in rural areas and the extent to which certain technology platforms are better suited to serve certain types of rural markets. It may also be important to identify the availability and subscribership of broadband at typical “anchor institutions,” such as schools, libraries and health institutions, which play a unique role in both introducing the benefits of broadband to a community as well as stimulating further subscriber growth. Furthermore, overlaying or correlating granular availability and subscribership data with data for other metrics, such as population density, income, and terrain, will allow policymakers to understand the steps needed to increase broadband availability and subscribership in particular rural areas.

90. *Speeds.* Information on the data transfer speeds available to and experienced by rural broadband users is an important component in assessing rural broadband deployment. The Commission has recognized that the broadband connection speeds that customers experience are neither constant nor identical to the advertised speeds or the theoretical maximums of a given network or particular service configuration.¹⁹⁹ Ideally, data collected on broadband speeds would acknowledge such differences and attempt to accurately reflect the average or typical data transfer rates that broadband users experience.

91. *Prices.* Because the price of broadband service affects the consumer’s decision whether or not to subscribe, detailed pricing information could be helpful in analyzing the lack of broadband subscribership in rural areas. We recognize that collecting and analyzing pricing information raises various complexities, such as how to determine the price of broadband service offered as part of a service bundle, how to account for introductory offers and promotions, and how to keep pace with frequent price fluctuations.²⁰⁰ Nevertheless, we believe information on broadband prices, including how prices vary among rural communities and service tiers, could be helpful because of the key role that prices play in broadband demand and adoption.

92. *Demand.* Policymakers also should consider obtaining detailed information on the demand for broadband services. As discussed in detail below,²⁰¹ promoting broadband deployment will require steps to increase broadband demand as well as supply. Addressing broadband demand effectively likely will require specific survey data on the interest or lack of interest in broadband service among non-subscribers, and the reasons for that interest or lack of interest. Such data ideally would be available for various demographics such as age, location, and income; for businesses; and for certain classes of institutional users, such as schools, libraries, public safety agencies, and hospitals.²⁰² A special focus also

¹⁹⁹ See *Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscribership Data, and Development of Data on Interconnected Voice over Internet Protocol*, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691, 9709–11, para. 36 (2008) (*2008 Broadband Data Gathering Order*).

²⁰⁰ See *id.* at 9710, para. 37.

²⁰¹ See *infra* Part V.C.

²⁰² See Microsoft Comments at 2 (arguing that schools need capacity sufficient to deliver high-quality video to the classroom, but noting that currently, there is no reliable data on the number or type of schools that have such capacity).

must be given to Tribal members and minorities, where the lack of broadband subscribership appears particularly acute.

93. *Infrastructure.* The metrics described above focus on evaluating the different components of the rural broadband marketplace. In addition to examining data for these metrics, a needs assessment also could examine information on the existing infrastructure in rural areas that is or could be used to provide broadband service. For example, policymakers could consider gathering data on the Internet backbone and middle-mile Internet access points,²⁰³ including fiber routes and fiber-lit locations; locations of base stations, towers, switches, and collocation facilities; and locations of non-communications infrastructure, such as water towers, railroads, and highways, that could support broadband network facilities.

94. *Federal Efforts to Assess Broadband Availability.* The Commission has been tracking broadband subscribership and deployment since 2000 through its Form 477 local competition and broadband deployment reporting program. Providers of high-speed Internet access service—formerly defined as data speeds exceeding 200 kbps in at least one direction—are required to submit to the Commission semi-annually data regarding several metrics, including their number of broadband subscribers, data rates, and technology platforms. In its Section 706 Reports, the Commission has used these data to assess whether “advanced telecommunications capability” is being deployed to all Americans in a reasonable and timely manner.²⁰⁴

95. Although past Section 706 Reports included an incomplete analysis of the broadband market and relied on data that lacked sufficient granularity,²⁰⁵ the changes to the Commission’s broadband data collection rules adopted in the *2008 Data Gathering Order* and the new requirements for Section 706 Reports included in the BDIA should improve those reports going forward. In the *2008 Data Gathering Order*, the Commission required most broadband providers to file subscribership information, including their number of subscribers—broken down by technology, speed tier, and business/residential—on a Census Tract level.²⁰⁶ That order increased the number of speed tiers (both upload and download) for broadband reporting purposes in order to provide a more granular depiction of the data rates at which broadband consumers access the Internet.²⁰⁷ Providers of mobile wireless broadband services must submit their broadband subscriber totals on a state-by-state basis as well as a list of the Census Tracts covered by their mobile broadband networks.²⁰⁸ In addition to reporting their number of broadband-capable mobile devices in use, mobile broadband providers now must specify the

²⁰³ As discussed above, this backbone is part of the foundation needed to make broadband services available in all areas. See *supra* Part V.A (regarding technological considerations).

²⁰⁴ See *supra* note 103 (regarding the Commission’s section 706 Reports).

²⁰⁵ See, e.g., *Section 706 Fifth Report*, 23 FCC Rcd at 9685 (Commissioner Copps, dissenting).

²⁰⁶ See *2008 Broadband Data Gathering Order*, 23 FCC Rcd at 9695–99, paras. 10–15.

²⁰⁷ The Commission updated the broadband reporting tiers to include upload and download speeds of: (1) greater than 200 kbps but less than 768 kbps; (2) equal to or greater than 768 kbps but less than 1.5 Mbps; (3) equal to or greater than 1.5 Mbps but less than 3.0 Mbps; (4) equal to or greater than 3.0 Mbps but less than 6.0 Mbps; (5) equal to or greater than 6.0 Mbps but less than 10.0 Mbps; (6) equal to or greater than 10.0 Mbps but less than 25.0 Mbps; (7) equal to or greater than 25.0 Mbps but less than 100.0 Mbps; and (8) equal to or greater than 100 Mbps—for a total of 72 tiers. *2008 Broadband Data Gathering Order*, 23 FCC Rcd at 9700–01, para. 20. The previous five “speed tiers” were based on the transfer rate of the connection’s faster direction and were divided as follows: (1) greater than 200 kbps but less than 2.5 Mbps; (2) greater than or equal to 2.5 Mbps but less than 10 Mbps; (3) greater than or equal to 10 Mbps but less than 25 Mbps; (4) greater than or equal to 25 Mbps but less than 100 Mbps; and (5) greater than or equal to 100 Mbps. *Local Telephone Competition and Broadband Reporting*, WC Docket No. 04-141, Report and Order, 19 FCC Rcd 22340, 22347–48, para. 14 (2004).

²⁰⁸ See *2008 Broadband Data Gathering Order*, 23 FCC Rcd at 9698–99, para. 16.

percentage of those users that have devices and subscription packages that permit them to access the lawful Internet content of their choice.²⁰⁹ Broadband providers subject to these reporting requirements must file Form 477 twice each year. The Commission staff is in the process of analyzing the first round of Form 477 filings under these new rules, which were due March 16, 2009. The next Form 477 data filings are due on September 1, 2009.

96. In addition to collecting the Form 477 broadband data, the Commission tracks the deployment of mobile wireless broadband networks in its *Annual CMRS Competition Reports*.²¹⁰ With this information, the Commission is able to estimate, at the Census Block level, the percentage of the U.S. population covered by various mobile broadband network technologies.²¹¹ The Commission annually collects data on cable system broadband capability, including subscriber numbers and capacity, using FCC Form 325.²¹² The Commission also collects data on the satellite industry for its *Annual Satellite Competition Reports*, which examine the reach of satellite-based, two-way broadband to the home.²¹³

97. In October 2008, Congress passed the BDIA, which provides for improved federal data on the deployment and adoption of broadband services.²¹⁴ That Act requires the Commission to issue its Section 706 Reports “annually” instead of “regularly” and adds several types of data regarding broadband services that the Commission must produce and evaluate. Specifically, the BDIA requires that the Commission’s Section 706 Report discretely identify “unserved” areas, as well as the population, population density, and average per capita income of each of these areas.²¹⁵ Further, the Commission must conduct a consumer survey at least annually that includes questions regarding broadband technology choices, prices, speeds, applications, consumer decisions and options.²¹⁶ The BDIA also requires the Commission to conduct and evaluate an international comparison of broadband speeds and prices.²¹⁷ On March 31, 2009, the Commission released a Public Notice seeking comment on how it should implement the BDIA’s consumer survey and international comparison requirements.²¹⁸

98. *Broadband-Related Efforts in the States.* Many efforts have been made at the state level to review and improve broadband deployment. For example, in California, Governor Schwarzenegger commissioned a Broadband Task Force to “remove barriers to broadband access, identify opportunities for increased broadband adoption, and enable the creation and deployment of new advanced

²⁰⁹ See *id.* at 9703–04, para. 23.

²¹⁰ These maps are provided through a contract with American Roamer. See *supra* note 47.

²¹¹ *Id.*

²¹² See 1998 Biennial Regulatory Review—*Annual Report of Cable Television Systems, Form 325, filed Pursuant to Section 76.403 of the Commission’s Rules*, CS Docket No. 98-61, Report and Order, 14 FCC Rcd 4720 (1999).

²¹³ E.g., *Annual Report and Analysis of Competitive Market Conditions with Respect to Domestic and International Satellite Communications Services*, IB Docket No. 07-252, Second Report, 23 FCC Rcd 151570 (2008).

²¹⁴ See *supra* Part III.D (regarding recent legislative developments).

²¹⁵ BDIA § 103(a).

²¹⁶ *Id.* § 103(c).

²¹⁷ Specifically, section 103(b) of the BDIA states: “As part of the assessment and report required by section 706 of the Telecommunications Act of 1996 (47 U.S.C. 157 note), the Federal Communications Commission shall include information comparing the extent of broadband service capability (including data transmission speeds and price for broadband service capability) in a total of 75 communities in at least 25 countries abroad for each of the data rate benchmarks for broadband service utilized by the Commission to reflect different speed tiers.” *Id.* § 103(b)(1).

²¹⁸ See *Comment Sought on International Comparison and Consumer Survey Requirements in The Broadband Data Improvement Act*, GN Docket No. 09-47, Public Notice, 24 FCC Rcd 3908 (2009).

communications technologies.”²¹⁹ This Task Force’s final report, issued in January 2008, includes broadband availability and speed maps as well as recommendations for improving broadband deployment throughout California.²²⁰ Similarly, in the Commonwealth of Virginia, Governor Kaine established a Broadband Roundtable to advance the goal of broadband access for all Virginia businesses by 2010.²²¹ The Roundtable has met with local and regional leaders and collected information concerning broadband deployment, community needs, and barriers to deployment throughout Virginia. As discussed above, in response to those meetings, the Roundtable created an online resource to guide participants in community-led broadband initiatives,²²² and in September 2008 issued a final report on broadband issues facing Virginia.²²³

99. Other efforts at the state level have focused on using public-private partnerships to expand access to broadband, while also assessing the demand for broadband services.²²⁴ These efforts include ConnectKentucky’s efforts to bring broadband services to previously unserved areas within Kentucky.²²⁵ Other states, including Minnesota, Ohio, South Carolina, Tennessee, and West Virginia, have adopted public-private partnerships following the ConnectKentucky model.²²⁶

100. Some states have provided tax incentives to encourage investment in broadband infrastructure and other related equipment and expenses;²²⁷ created dedicated funding that leverages private sector funds to increase investment in broadband infrastructure;²²⁸ and engaged local communities to identify and increase demand for broadband deployment in unserved areas.²²⁹ Finally, there have been a number of regional efforts to increase rural broadband deployment. For example, in Southeastern

²¹⁹ CALIFORNIA BROADBAND REPORT at 7.

²²⁰ *Id.*

²²¹ XO/Nextlink Comments at 2.

²²² *See supra* at 65; *see also* Virginia.gov Toolkit.

²²³ COMMONWEALTH’S BROADBAND ROUNDTABLE, FINAL REPORT (Sept. 9, 2008) *available at* http://www.otpba.vi.virginia.gov/pdf/Governor_report.pdf (last visited May 18, 2009) (VIRGINIA BROADBAND ROUNDTABLE FINAL REPORT); *see also* XO/Nextlink Comments at app. A.

²²⁴ *See, e.g.*, Connected Nation Comments at 1–3.

²²⁵ Connected Nation at Comments at 1. ConnectKentucky, a pilot program that led to Connected Nation, worked with the private sector to create an online map of broadband availability in Kentucky and to conduct consumer surveys to identify barriers to broadband adoption in that state. Connected Nation Comments at 1, 12–13.

²²⁶ Connected Nation Comments at 8; *see* Harris Corporation Comments at 4 (supporting public-private partnerships because private companies can contribute “managerial efficiencies and technological proficiency,” while government can “provide the economic incentive for private companies to deploy broadband in rural areas, especially where such an incentive has never previously existed”).

²²⁷ *See infra* Part V.C (regarding stimulating demand).

²²⁸ *See, e.g.*, NGA, STATE EFFORTS TO EXPAND BROADBAND (stating that the California Public Utilities Commission allocated \$100 million to provide matching funds of up to 40% of the total project cost of broadband infrastructure deployment projects in California); *id.* (stating that the Vermont Telecommunications Authority has the authority to issue up to \$40 million in state-backed bonds to finance the construction of broadband infrastructure in Vermont).

²²⁹ *See* Pennsylvania Comments at 2. *See generally* BROADBAND INVESTMENT FOR ECONOMIC RECOVERY: PERSPECTIVES OF AN AD-HOC GROUP OF STATE BROADBAND ENTITIES 5–6 (Feb. 9, 2009), *attached to* Massachusetts Comments (describing a variety of approaches that states have used to encourage broadband deployment, including creating specific agencies to focus on broadband; fostering public-private cooperation and co-investment; funding access with grants or loans; streamlining rights of way; mapping broadband facilities; promoting education efforts; encouraging inclusion of telecommunications infrastructure in the planning and deployment of capital improvement projects; and setting goals for broadband deployment and use).

Wisconsin, an advisory committee was established to implement a regional broadband plan covering seven counties, of which about 64 percent of the land area is rural.²³⁰ The Appalachian Regional Commission and the Delta Regional Authority also have made efforts to encourage broadband deployment in their respective regions.²³¹

2. Broadband Mapping

101. Mapping provides a powerful and expressive way to convey information, and may be uniquely suited to explaining the status and progress of the evolution of broadband deployment and to targeting deployment obstacles. In the rural context, broadband mapping is a necessary tool for identifying and tracking broadband service availability and infrastructure deployment. However, as with any visualization or other presentation of information, the utility of a map is only as good as the underlying data, and the accuracy and reliability of such data must be verifiable. Similarly, broadband mapping efforts must reconcile the sometimes competing concerns of technical limitations, confidentiality, and infrastructure security.

102. The Recovery Act directs NTIA to create a “comprehensive nationwide inventory map of existing broadband service capability and availability” that shows the geographic extent to which that capability is deployed and available for each state.²³² By February 2011, NTIA should to the extent practical make this inventory map accessible by the public on an NTIA website in a form that is interactive and searchable.²³³

103. A number of different organizations have begun to map broadband availability in several states.²³⁴ The entities vary, although most of them are public-private partnerships,²³⁵ or task forces established by a governor and similarly comprised of community, government, and broadband industry representatives.²³⁶ In addition, a handful of state public utility commissions also map broadband availability,²³⁷ as do certain state-sponsored initiatives.²³⁸ Apart from mapping, these organizations generally seek to promote broadband deployment throughout their states, particularly in rural areas. These organizations typically rely on voluntary submissions of data on residential broadband availability, and the entities collocating the data often sign non-disclosure agreements and make other commitments (such as agreeing to depict only aggregated data) in response to providers’ requests for confidentiality.²³⁹

²³⁰ HierComm Comments at 2–3.

²³¹ Connected Nation Comments at 8.

²³² Recovery Act § 6001(l).

²³³ *Id.*

²³⁴ See, e.g., Connected Nation Comments at 8 (identifying Alabama, Arkansas, California, Colorado, Hawaii, Illinois, Kansas, Kentucky, Maine, Massachusetts, Minnesota, North Carolina, Ohio, Tennessee, Virginia, and West Virginia); see Broadband Access in Illinois, Institute for Regulatory Policy Studies, Illinois State University, August 2007, available at <http://www.irps.ilstu.edu/broadband/IRPS%20Broadband%20Report%20080907.pdf> (last visited March 20, 2009); e-NC, Broadband Access in North Carolina, <http://e-ncbroadband.org/> (last visited April 1, 2009).

²³⁵ See, e.g., Connected Nation Comments at 1, 7 (explaining that Connected Nation is a non-profit organization with operations in nine states that grew out of the ConnectKentucky pilot initiative).

²³⁶ See, e.g., CALIFORNIA BROADBAND REPORT; VIRGINIA BROADBAND ROUNDTABLE FINAL REPORT.

²³⁷ See, e.g., VT DEP’T OF PUB. SERV., APPROXIMATE BROADBAND AVAILABILITY IN VERMONT—2006 (2007), http://publicservice.vermont.gov/cable/broadband_availability_map.html.pdf (providing a map of broadband availability).

²³⁸ See, e.g., e-NC Authority, Who We Are, <http://www.e-nc.org/WhoWeAre.asp> (last visited April 1, 2009).

²³⁹ See, e.g., Comments of Connected Nation, WC Docket No. 07-38 at 35.

Many of these mapping efforts have resulted in useful maps of network broadband availability, although we are aware of no state mandate that all broadband providers must submit broadband availability data. We note also that certain commenters in the Commission's availability mapping proceeding question the independence and effectiveness of many of the non-governmental broadband mapping organizations.²⁴⁰

104. Several federal agencies have mapping programs for various initiatives. Federal mapping efforts can and should play a pivotal role in overcoming the challenges that currently impede rural broadband deployment. Elsewhere in this Report, we discuss in detail the importance of coordination among governmental organizations and private parties.²⁴¹ Such coordination will be critical to making the best use of the data being gathered through the efforts discussed above.²⁴² We recognize the importance of including all rural areas, particularly Tribal lands, in federal mapping efforts. Pursuant to the Recovery Act and the BDIA, the Commission and the Administration should continue their efforts to coordinate federal, Tribal, state, local, and private mapping efforts.

C. Stimulating and Sustaining Demand for Broadband

105. A critical component in addressing solutions to promote rural broadband deployment is ensuring the sustainability of rural broadband networks. That is, once built, the networks must generate enough revenue to cover their costs. Several surveys show that a substantial percentage of consumers in the United States have access to broadband services, but choose not to subscribe.²⁴³ Given that sustained deployment of broadband services is unlikely without sufficient consumer demand for broadband services, a strategy designed to promote rural broadband adoption must examine and address the discrepancy between broadband availability and broadband adoption. Rural areas have diverse populations and varied terrains.²⁴⁴ They also have variable access to resources, and are served, if at all, by various types of providers (*e.g.*, a large incumbent LEC, a small local cooperative, or a WISP), each of which may have differing levels of technical expertise, business experience, and access to capital markets. We discuss below the various factors that may affect demand for, and sustainability of, broadband services in rural areas.

²⁴⁰ See, *e.g.*, American Public Power Ass'n. Comments, WC Docket No. 07-38, at 5; Consumers Union Comments, WC Docket No. 07-38, at 6–7 n.4, 17; Kentucky Municipal Utilities Reply, WC Docket No. 07-38, at 6, 13. *But see* Connected Nation Comments, WC Docket No. 07-38, at 6, 10, 12-13 (stating that the vast majority of Connected Nation's funding is from public sources and it is unbiased and that its ability to keep data confidential increases voluntary disclosures by providers); Connected Nation Reply, WC Docket No. 07-38, at ii–iii, 12–18.

²⁴¹ See *supra* Part IV.A (discussing interagency coordination).

²⁴² See *supra* Part V.B.1 (discussing broadband data collection).

²⁴³ See Connected Nation Comments at 9 (stating that according to a Connected Nation study, approximately 90% of households in the U.S. have access to some form of broadband service, but only 50% of households choose to subscribe); NCTA Comments at 15, Attach. 1 at 2 (estimating that there are approximately 35 million households in the U.S. that have access to broadband but do not currently use it).

²⁴⁴ See, *e.g.*, Rural Broadband Policy Group at 5 (noting the diversity of rural America in “terrains, cultures, foods, peoples, and knowledge” and opining that there is no “one size fits all solution”); Access Humboldt Comments at 1 (agreeing with the Rural Broadband Policy Group).

106. Several factors may contribute to low consumer demand for broadband services.²⁴⁵ First, a lack of training and knowledge regarding the benefits of Internet access may hinder broadband adoption.²⁴⁶ Many individuals in non-broadband households view broadband as either unimportant or difficult to use.²⁴⁷ For example, TIA claims that approximately 42 percent of rural residents without broadband at home fail to subscribe because of a “perceived lack of need.”²⁴⁸ The Pew American Home Life Project survey found similar perceptions among those that did not have Internet access, finding that an estimated 40 percent of non-users do not use the Internet because “they are not interested” or view it as “a waste of time.”²⁴⁹

107. Another demand and sustainability factor is the affordability of broadband services to consumers, which may include continuing subscription costs, computer equipment costs,²⁵⁰ and the costs of other customer premises equipment necessary to access broadband services.²⁵¹ Some studies show that many dial-up users believe they cannot afford broadband services.²⁵² According to CFA/CU, only 15 percent of rural households with annual incomes less than \$25,000 have broadband subscriptions whereas 45 percent of rural households with annual incomes greater than \$25,000 have broadband access in the home.²⁵³ These studies demonstrate that the inability of consumers to afford either broadband service or the computer equipment necessary to access broadband service at current market prices is a likely barrier to broadband adoption and sustainability in certain rural markets.

²⁴⁵ For example, one estimate of the demand for Internet access services indicates that approximately 29% of the U.S. population in 2007 did not use the Internet. Internet use is defined as a household with a subscription to either broadband or dial-up or use of a terminal outside the home to access the Internet. See U.S. CENSUS BUREAU, TABLE 1118. HOUSEHOLD INTERNET USAGE IN AND OUTSIDE OF THE HOME, BY SELECTED CHARACTERISTICS: 2007, <http://www.census.gov/compendia/statab/tables/09s1118.pdf> (last visited May 19, 2009) (TABLE 1118). TIA, citing to the Pew Internet and American Life Project, claims that approximately one quarter of the population does not use the Internet. TIA Comments at 4.

²⁴⁶ See, e.g., NCTA Comments at 15; TIA Comments at 4.

²⁴⁷ See, e.g., NCTA Comments, Attach. at 10 (citing John B. Horrigan, *Obama’s Online Opportunities II: If You Build It, Will They Log On?*, at iii, 12 (2009))

²⁴⁸ See CONNECTED NATION, CONSUMER INSIGHTS TO AMERICA’S BROADBAND CHALLENGE 11 (Oct. 13, 2008), available at http://www.connectednation.com/_documents/ConsumerInsightsBroadbandChallenge_20081013.pdf (CONNECTED NATION REPORT), cited by TIA Comments at 4. According to NCTA, nearly half of the population that does not subscribe to broadband says it does not need such a connection. NCTA Comments, Attach. at 10 (citing CONNECTED NATION REPORT at 2).

²⁴⁹ See 2008 PEW BROADBAND ADOPTION STUDY at 12–13.

²⁵⁰ According to TIA, 34% of rural consumers do not have Internet access due to the lack of a computer. TIA Comments at 4.

²⁵¹ In the *National Broadband Plan NOI*, the Commission sought comment on the extent to which it should encourage or subsidize broadband subscription in areas where service is already available. *National Broadband Plan NOI* at paras. 27, 39–41, 54.

²⁵² See NCTA Comments, Attach. A at 11 (citing 2008 PEW BROADBAND ADOPTION STUDY at ii, 11, to show that 35 percent of consumers surveyed responded that the price of broadband would have to fall for them to subscribe).

²⁵³ See CFA/CU Comments at 2. Another estimate shows that for households with an income in the \$20,000 to \$24,999 range, 28.9% had broadband subscriptions, whereas 77% of the households with incomes in the \$75,000 to \$99,999 range subscribed to broadband services. See NTIA, HOUSEHOLDS USING THE INTERNET. The Benton Foundation also provides an estimate of decreasing broadband adoption by income. For Americans with incomes under \$20,000 annually, broadband penetration has fallen from 29% in 2007 to 25% in 2008. Benton Foundation Comments at 6.

108. Demand-side programs can effectively promote the adoption and use of broadband among underserved and rural populations.²⁵⁴ Congress already has taken important steps in this regard. For example, the BTOP program, established by the Recovery Act, provides funding for, among other measures, grants to provide broadband education, awareness, training, access, equipment, and support to educational institutions, libraries, healthcare providers, and other community support organizations to facilitate greater use of broadband. The Recovery Act also directs grants to support organizations and agencies that provide outreach, access, equipment, and support services to facilitate greater use of broadband service by low-income, unemployed, aged, and otherwise vulnerable populations.²⁵⁵ The Recovery Act provides, in addition, at least \$250 million in funding for innovative programs to encourage sustainable adoption of broadband service.²⁵⁶ In singling out these purposes, Congress recognized the importance of consumer affordability and education in ensuring the adoption and sustainability of rural broadband networks.

109. In its *National Broadband Plan* proceeding, the Commission is exploring long-term solutions to address the lack of demand for broadband services.²⁵⁷ Specifically, the *National Broadband Plan NOI* sought comment on improving digital literacy and media literacy skills, increasing broadband access device ownership, and the effect of content and copyright protections on broadband network deployment and usage.²⁵⁸ The *National Broadband Plan NOI* also sought comment on the extent to which a centralized clearinghouse for outreach and computer and broadband training initiatives should be a component of the national broadband plan.²⁵⁹

110. Some training and education programs are already underway to increase adoption of broadband in local communities.²⁶⁰ Rural libraries, which currently serve as an access point for broadband Internet service, can provide another avenue for Internet training and education, as librarians are well-positioned to educate and train individuals on the benefits of Internet access.²⁶¹ Further, libraries can stimulate demand for broadband services by hosting community fora and providing training on accessing specific information.²⁶² Rural libraries can also function as public computing centers, providing broadband Internet access to patrons, which in turn can help stimulate further demand for consumer broadband services.²⁶³ We suggest that Internet education focus on general digital literacy as well as the

²⁵⁴ See, e.g., Benton Foundation Comments at 8, Attach. at 7, 10; Rural Broadband Policy Group Comments at 1; Connected Nation Comments at 3, 9; NASUCA Comments at 5–6; NCTA Comments at 15, Attach. at 1–2, 4.

²⁵⁵ Recovery Act § 6001(b).

²⁵⁶ Recovery Act, Division A, Title II, National Telecommunications and Information Administration (Broadband Technology Opportunities Program Appropriations).

²⁵⁷ *National Broadband Plan NOI* at paras. 55–57.

²⁵⁸ *Id.*

²⁵⁹ *Id.*

²⁶⁰ For example, Connected Nation operates community-based organizations that sponsor computer training and education to increase the value of accessing the Internet for businesses. Connected Nation Comments at 10. Connected Nation also sponsors grassroots “eCommunity Leadership Teams” comprised of community leaders from key sectors that develop and implement technology promotion plans within their communities. Connected Nation Comments at 11–12. However, we note that these programs are not necessarily specifically directed to rural areas.

²⁶¹ See ALA Comments at 3.

²⁶² See ALA Comments at 3, 6.

²⁶³ Public computing facilities can provide numerous benefits to users in the community. See generally U.S. Dep’t of Hous. and Urban Dev., Multifamily Housing – Neighborhood Networks, <http://www.hud.gov/offices/hsg/mfh/nnw/nnwaboutnn.cfm> (last visited May 19, 2009) (describing HUD’s Neighborhood Networks initiative, which encourages property owners and managers to open onsite, multiservice technology centers, which has resulted in

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many Internet-based resources that can benefit users, such as access to healthcare information, education of children and adults, financial planning, online banking, online shopping, and electronic mail. Further, it is imperative that education and training initiatives be forward-looking to ensure continued and sustained subscription to broadband services in rural areas.

111. Both public and private entities, including broadband providers, should consider programs designed to stimulate broadband adoption and sustainability among targeted groups. Pennsylvania has established a special program that aggregates demand in communities looking to achieve an agreed-upon deployment threshold.²⁶⁴ This program provides state grants for outreach and demand aggregation activities, including programs on the benefits and use of broadband services.²⁶⁵ Communities may also want to consider ways to aggregate or consolidate demand as part of developing a strategy for a sustainable broadband network.²⁶⁶ Participants in this effort could include individual consumers, businesses, educational institutions, health care facilities, and government agencies. Entities that can function as anchor tenants with adequate demand to both spur broadband infrastructure investment and ensure sustainability can function as an integral part of a rural broadband strategy.

112. Furthermore, public and private entities also should consider programs, such as making computers or laptops available at a discount to qualifying households or discounting monthly service, designed to make broadband affordable to those with low incomes.²⁶⁷ The Commission has also sought comment on establishing a Broadband Lifeline/Link Up pilot program to examine how the low-income universal service support program can be used to enhance access to broadband Internet access services for low-income Americans.²⁶⁸

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more than 1,400 Neighborhood Networks centers across the U.S. that offer job-training classes in computer skills, resume writing, and interviewing techniques; job placement services; General Educational Development (GED) preparation; English as a Second Language (ESL) classes; programs that allow seniors to become familiar with computers and use them to better their lives, whether through staying in touch with family and friends via e-mail or searching for healthcare benefits online; and computer access for children whose families cannot afford their own).

²⁶⁴ See Pennsylvania Comments at 2.

²⁶⁵ See PA. DEP'T OF CMTY. AND ECON. DEV., BROADBAND OUTREACH AND AGGREGATION FUND, PROGRAM GUIDELINES 1 (June 2006), <http://www.newpa.com/download.aspx?id=989>.

²⁶⁶ For example, Pennsylvania has established a special program that aggregates demand in communities looking to achieve an agreed upon deployment threshold. See Pennsylvania Comments at 2.

²⁶⁷ See, e.g., NCTA Comments at 15. For example, recognizing that customer premises equipment (CPE) costs can be a barrier to broadband implementation and adoption, the National Rural Telecommunications Cooperation (NRTC) recently announced a subsidized leasing program for its members to pass on to customers in their rural markets. Thus, WildBlue satellite service customers can now gain access to the service for just \$99, which includes CPE and installation. Under this program, the actual CPE cost of \$400 is subsidized by NRTC and its members. This program has been launched as a test to help expand access to broadband. NRTC Comments at 6.

²⁶⁸ See *High-Cost Universal Service Support; Federal-State Joint Board on Universal Service; Lifeline and Link Up; Universal Service Contribution Methodology; Numbering Resource Optimization; Implementation of the Local Competition Provisions in the Telecommunications Act of 1996; Developing a Unified Intercarrier Compensation Regime; Intercarrier Compensation for ISP-Bound Traffic; IP-Enabled Services*, CC Docket Nos. 01-92, 99-200, 99-68, 96-98, 96-45, WC Docket Nos. 06-122, 05-337, 04-36, 03-109, Order on Remand and Report and Order and Further Notice of Proposed Rulemaking, FCC 08-262, para. 40; app. A, paras. 64-91; app. C, paras. 60-87 (rel. Nov. 5, 2008) (*November 2008 Further Notice*). Specifically, the Commission sought comment on making available \$300 million each year for three years to enable eligible telecommunications carriers to provide discounts on broadband Internet access service and the necessary access devices to low-income consumers. See *id.* The Commission's existing Low-Income program, discussed *infra*, helps ensure that the costs of starting and continuing

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D. Addressing Network Costs

113. As a general matter, the costs involved in deploying a broadband network are significant, requiring providers to purchase electronic equipment,²⁶⁹ obtain access to rights of way,²⁷⁰ interconnect with other networks, and construct the actual network.²⁷¹ Yet, rural networks can often be even more expensive to deploy and potentially more expensive to maintain than networks in non-rural areas for a variety of reasons, which can serve as a formidable barrier to rural broadband deployment.²⁷² Rural broadband networks typically serve far fewer customers per square mile than urban and suburban networks,²⁷³ and often cover larger land areas that may include challenging topographies and climate conditions,²⁷⁴ making it extremely costly to provide broadband service to remote areas.²⁷⁵ For example, the topography in such areas may limit the reach of wireless transmission facilities on individual towers, and, consequently, more towers may need to be built, thereby increasing the cost of wireless broadband deployment. Similarly, because radio signals using spectrum below 1 GHz generally penetrate environmental obstructions better than signals using higher bands,²⁷⁶ licensees with spectrum only in the higher frequency bands may need to deploy more infrastructure, including towers, to cover the same land area, which can also lead to higher deployment costs in rural areas. In addition, the cost of extending telecommunications lines to remote areas contributes to higher deployment costs in rural areas. It is notable that costs may vary among, for example, fiber,²⁷⁷ digital subscriber line (DSL),²⁷⁸ and cable deployment.²⁷⁹

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telephone service do not prevent low-income consumers from receiving telephone service. *See infra* Part VI.A (discussing Universal Service).

²⁶⁹ *See* HierComm Comments, Attach. 3, tbl. 18 (listing equipment and costs for wireless broadband deployers).

²⁷⁰ *See generally* Fibertech/KDL Comments (discussing pole make ready costs and rents).

²⁷¹ *See generally* HierComm Comments, Attach. 1 (discussing assessments made by deployers).

²⁷² *See* GAO, BROADBAND DEPLOYMENT IS EXTENSIVE THROUGHOUT THE UNITED STATES, BUT IT IS DIFFICULT TO ASSESS THE EXTENT OF DEPLOYMENT GAPS IN RURAL AREAS, GAO-06-426, at 19 (May 2006) (GAO BROADBAND REPORT); Embarq Comments at 3 (stating that the high cost of deployment remains the “principal barrier to rural advanced services”); MSS/ATC Coalition Comments at 3 (asserting that both wireline access and terrestrial wireless networks are economically impractical in remote areas).

²⁷³ *See, e.g.*, Embarq Comments at 12 n.18 (noting the cost differences per line between rural customers that live in a cluster and those in outlying areas); Stephouse Networks Comments at 2 (describing the low population densities and mountainous terrain of its service areas).

²⁷⁴ For example, commenters point out that deployment in rural areas can be especially expensive and complicated because of relatively inaccessible, rugged terrain. *See* Valerie Fast Horse Comments at 3 (describing low and thickly forested areas where there are “no possible means to deliver broadband”); PBIA Comments at 6 (stating that because of their remoteness and challenging terrain, the communities of western Alaska have not been accessible to fiber networks). This terrain often includes mountains or forests that can obstruct wireless technologies that require line-of-sight transmission. GAO BROADBAND REPORT at 19; *see also supra* Part V.A (discussing Technological Considerations).

²⁷⁵ *See, e.g.*, NRECA Comments at 1 (stating that “[l]ow population densities coupled with the issue of traversing vast expanses of remote and often rugged topography” create a financial barrier to rural broadband deployment); Embarq Comments at 13 (“In rural America, however, high-costs and low population densities make investment and provision of broadband service uneconomic (just as has been and still is the case with basic voice service pursuant to carrier-of-last-resort obligations).”).

²⁷⁶ *See supra* Part V.A (discussing Technological Considerations).

²⁷⁷ *See, e.g.*, VT. DEP’T OF PUB. SERV., UNDERSTANDING BROADBAND DEPLOYMENT IN VERMONT 14 (2007), <http://publicservice.vermont.gov/Broadband/Broadband%20Deployment%20in%20Vermont%20Final.pdf> (VT.

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114. Access to adequate and affordable “middle-mile” broadband facilities—the facilities that are commonly used to connect the “last mile” ISP with an Internet backbone service provider—is a necessary precursor to a provider’s being able to deploy broadband services to its customers. Although rural broadband networks are fundamentally similar to broadband networks in non-rural areas in that they involve both a local access or distribution network²⁸⁰ and a backhaul component,²⁸¹ rural broadband networks are also typically built in locations that are geographically more removed from Internet backbone nodes.²⁸² In many cases, because of this more distant location, the rural broadband provider will need to obtain backhaul transport, or “middle mile” facilities, from more than one provider, often over facilities that were designed for voice telephone or cable television services.²⁸³ Some of these “middle mile” facilities may have insufficient capacity, causing the transmission speed on otherwise adequate last-mile broadband facilities to come to a crawl or stall before the data reach the Internet backbone.²⁸⁴ Overcoming this may require the construction of a dedicated facility, which drives up costs and can deter last-mile broadband investments.²⁸⁵ Moreover, even when the last-mile provider acquires access to adequate middle-mile facilities, that access may be prohibitively expensive.²⁸⁶ Consequently, backhaul transport costs in rural areas can be significantly higher than for networks in other areas.²⁸⁷

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BROADBAND REPORT) (stating that in many rural areas of Vermont the average build-out cost for fiber-to-the-premise networks would likely be close to \$4,000 per subscriber).

²⁷⁸ NATIONAL EXCHANGE CARRIER ASSOCIATION, THE PACKET TRAIN NEEDS TO STOP AT EVERY DOOR 13 (2006) (estimating the cost of upgrading a traditional telephone line to DSL as follows: \$988 per line for the telephone company’s central office service area; \$1,083 per line for the mid-range service area; and \$4,865 per line for areas not served by central offices).

²⁷⁹ See, e.g., VT. BROADBAND REPORT at 13 (estimating the cost for cable line extensions in Vermont at \$20,000 per mile).

²⁸⁰ The local access network, either wireline (e.g., cable, DSL, fiber) or wireless (e.g., WiMAX, EV-DO), connects a local network in a particular area, which could range in size from a single house or farm in a rural area to a small town.

²⁸¹ The backhaul network, which can be either wireline or wireless, connects the local network to an Internet backbone connection point.

²⁸² See NECA Comments at 5–6 (noting from its 2001 study that 55% of rural switches are more than 70 miles from an Internet Backbone Provider node and 10% are more than 200 miles away).

²⁸³ See DigitalBridge Comments at 8–9 (“Many middle-mile facilities were originally built by telephone and cable companies for ordinary telecommunications or cable television services. Rural communities are often still reliant upon these antiquated copper telephone and cable infrastructures, which lack the capabilities to deliver high-speed, broadband access.”); see also, e.g., City of Shafter Comments at 4 n.6.

²⁸⁴ Commenters state that if an incumbent LEC does not build or tariff any high-capacity middle-mile lines, the ISP may have its data come to a crawl or stall as the data attempt to join the greater communications network using the LEC’s low-capacity facilities. See DigitalBridge Comments at 8–9; GCI Comments at 3.

²⁸⁵ See Microsoft Comments at 4 (“We understand from some network operators, for example, that the local cost of upgrading wires and distributing broadband is not a hurdle. The marginal cost of adding subscribers to broadband systems can be more than covered by subscriber fees. However, rural or remote providers cannot take advantage of those economics, because the cost of acquiring high-capacity facilities between the Internet backbone and the community is too high. Once this hurdle is overcome, we believe that in many instances the market can remedy the problem of delivering affordable broadband to Main Street and neighborhoods.”).

²⁸⁶ See NECA Comments at 6 n.15 (quoting Verizon as stating that “[i]n some rural high-cost areas, however, the cost of the additional transport mileage is high enough to impinge on a rural broadband provider’s ability to offer services in those areas”); see also OPASTCO Comments at 8–9 (“Another significant obstacle that rural ILECs face in deploying broadband to additional rural consumers and increasing the broadband speeds that they offer is the high price of access to the Internet backbone. The price of backbone access is based upon mileage, among other factors,

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115. There is no one solution to addressing middle mile transport costs in rural areas. Commenters suggest explicitly encouraging middle-mile buildout,²⁸⁸ revising universal service funding to help cover costs of the middle-mile,²⁸⁹ and using current or potential infrastructure more effectively by coordinating with other infrastructure projects to shrink deployment costs, and reforming interconnection obligations.²⁹⁰ Others suggest that these facilities be offered at cost-based or favorable rates on nondiscriminatory terms and conditions.²⁹¹

116. The regulatory process associated with obtaining access to rights of way on “Indian lands” may add to the costs of bringing broadband services to Tribal members. These high costs of deploying broadband to rural areas can be compounded by potential providers’ experiencing difficulties gaining access to capital.²⁹² Gaining access to capital can be a problem for rural providers that have fewer customers over whom they can spread the costs of providing broadband service. This entry barrier increases with the more capital that is needed to cover minimum costs,²⁹³ which can be particularly pronounced in rural areas.

117. Although the free market has many benefits, such as driving down the costs of services for consumers and improving service quality, it also can leave behind geographic areas with high costs and lower profit potential.²⁹⁴ Such is the case with many rural areas. Market forces often demand returns commensurate with investment risk. In many parts of rural America, the relatively high deployment costs per potential customer make relying on market forces alone an inadequate strategy for promoting the

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and the further removed a carrier is from a backbone facility, the higher the price they must pay. Thus, rural ILECs who are on average much further away from these facilities face higher than average costs for Internet backbone access. In addition, rural ILECs that wish to upgrade their broadband networks to provide their customers with higher speeds must also upgrade their backbone access, incurring even higher costs. Moreover, the majority of rural ILECs have only one choice of provider for connecting to the Internet backbone.”) (citations omitted).

²⁸⁷ Several commenters have expressed concern that high backhaul costs present a barrier to broadband deployment in rural areas. *See* DBC Comments at 8–9 (urging the Commission to ensure that affordable backhaul is available for rural operations); Fibertech/KDL Comments at 9 (stating that backhaul costs can be “prohibitively expensive” in rural areas); GCI Comments at 3 (citing cost-effective middle-mile transport as essential to broadband deployment in rural Alaska); ACA Comments at 3 (arguing that grant and loan programs should allow operators to build middle-mile fiber backhaul infrastructure to increase speeds and lower operational costs).

²⁸⁸ *See* NECA Comments at 6–7 (encouraging partnerships and consortia by interested groups); *see also generally* ALA Comments at 2, CFA/CU Comments at 4, Microsoft Comments at 1–4 (all recommending using government funds to rollout fiber to anchor institutions, thereby providing incentives for last mile providers to buildout later).

²⁸⁹ *See* NECA Comments at 6 nn.15–16.

²⁹⁰ *See* Fibertech/KDL Comments at 2-3; New America Foundation Comments, Attach. at 3 (arguing that fiber should be deployed with highway construction); Letter from Michele C. Farquhar, Counsel to Sprint Nextel Corporation, Special Counsel to FiberTower Corporation and Rural Telecommunications Group, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 09-29, ET Docket Nos. 04-186, 02-380 at 1-2 (filed Apr. 13, 2009) (Sprint Nextel *et al.* April 13, 2009 *Ex Parte* Letter) (asking the Commission to expand the amount of licensed spectrum that can be used for wireless backhaul services, such as White Spaces, which lie fallow in rural areas); City of Shafter Comments at 4 n.6 (noting that despite building a fiber network and having two Internet backbone providers nearby, the city had difficulty connecting directly to an Internet Backbone Provider).

²⁹¹ *See* NTCA Comments at 26–27; Sprint Comments at 8; OPASTCO Comments at 8–9.

²⁹² *See, e.g., Thirteenth CMRS Competition Report* at para. 100 (finding that the inability of new firms to borrow sums sufficient to finance efficient start-ups can be an entry barrier).

²⁹³ *See id.*

²⁹⁴ *See supra* Part III.B (The State of Broadband in Rural Areas).

deployment of broadband services. The repercussions of relying on market forces alone ultimately would be felt throughout America because many of rural broadband's benefits go beyond the direct benefits to the rural subscriber and the direct profits to the broadband deployer.²⁹⁵ Ultimately, as the Commission recognized regarding the need for universal telephone service,²⁹⁶ the more individuals that are on the network, the greater value of the network itself.²⁹⁷ Moreover, the more extensive a network, the greater the benefits to be derived from the network.²⁹⁸ The same is true of an extensive broadband network.²⁹⁹ Therefore, we believe that government action is needed to encourage deployment of broadband to rural areas.

118. To that end, various government entities have implemented programs to encourage the buildout of broadband infrastructure to rural areas. Recent legislation has created several opportunities for organizations seeking to build out broadband infrastructure and provide services to unserved and underserved areas to receive grants, loans, or loan guarantees to help defray deployment costs. In addition, a number of states have enacted tax incentives designed to help offset deployment costs in order

²⁹⁵ See *supra* Part III.A (Rural Broadband: Why it Matters).

²⁹⁶ See *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Report and Order, 12 FCC Rcd 8776, 8783, para. 8 (1997) (subsequent history omitted) (*Universal Service First Report and Order*) (“At the simplest level, increasing the number of people connected to the telecommunications network makes the network more valuable to all of its users by increasing its usefulness to them.”).

²⁹⁷ This “network effect” is a reason why the Commission has an explicit universal service program to ensure that people are connected to the telephone network. See *id.* A “network effect” may be illustrated by observing that all else being equal (with two non-interconnected networks), a customer is more likely to choose a network that serves 80% of the population, instead of one that serves 20% of the population, because the larger network is more likely to serve more people that the customer may want to call. See JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS 4–5 (2005); Big Think Strategies Comments at 7.

²⁹⁸ Aside from network effects, larger networks also have other indirect benefits, or positive externalities, that arise merely because the network reaches more users. In the *Universal Service First Report and Order*, the Commission noted that “[i]ncreasing subscribership also benefits society in ways unrelated to the value of the network per se. For example, all of us benefit from the widespread availability of basic public safety services, such as 911.” See *Universal Service First Report and Order*, 12 FCC Rcd at 8783, para. 8.

²⁹⁹ A broadband-connected Internet also produces network effects. Unlike dial-up connections, broadband connections can be used to create “two-way networks” for applications like VoIP and video conferencing. See *supra* notes 178–184 (listing interactive broadband applications). In addition to these network effects, ubiquitous broadband would produce other positive externalities. See Big Think Strategies Comments at 17. For instance, a vastly interconnected broadband network would allow Next Generation 911 to be deployed throughout the country to the benefit of those who live in or may visit areas that otherwise would lack access to broadband services. See DEP’T OF TRANS., NEXT GENERATION 9-1-1 SYSTEM PRELIMINARY CONCEPT OF OPERATIONS (2005), <http://www.its.dot.gov/NG911/pdf/ConOps.pdf>. Dial-up connections are increasingly impractical for many Internet applications; thus, dial-up users do not add as great a value to the network and cannot contribute to as many of the positive externalities as broadband-connected users. See generally *supra* Part III.A (describing the benefits of broadband).

to encourage the provision of broadband services to consumers.³⁰⁰ Many rural cooperatives are deploying broadband to rural areas through collaborative efforts and by obtaining federal or state funding support.³⁰¹

119. An alternative solution that has been adopted in some areas is government sponsorship or ownership of broadband networks.³⁰² Commenters suggest that many successful government-sponsored investments in the United States have involved the deployment of fiber networks in cities;³⁰³ however, some rural areas also have benefited from government-sponsored broadband deployment.³⁰⁴ Although many have expressed concerns regarding the provision of government-sponsored or government-owned broadband services, raising questions about the appropriate role of government as a broadband service

³⁰⁰ See, e.g., MISS. CODE ANN. § 57-87-1 *et seq.* (providing tax credits to providers that deploy broadband equipment, ranging from five to 15% of the cost of the broadband equipment, with the higher tax credits going to those providers that deploy equipment in the least populous regions of the state); FLA. STAT. § 220.183 (providing receive income tax credits to broadband providers for any project designed to increase a community's access to broadband facilities, including those communities located in rural areas); HAW. REV. STAT. § 235-110.51 (providing that up to 4 % of a commercial building's renovations costs may be deducted if the building's telecommunications facilities are upgraded to high-speed telecommunications systems that can provide Internet access, direct satellite communications access, and videoconferencing facilities).

³⁰¹ See Chuck Huckaby, *Maryland Broadband Cooperative Connects Rural Counties*, WORK AT HOME BUSINESS OPPORTUNITIES, Oct. 11, 2007, <http://work-at-home.business-opportunities.biz/2007/10/11/maryland-broadband-cooperative-connects-rural-counties/> (last visited May 13, 2009) (describing the Maryland Broadband Cooperative (MDBC)'s connection of nine counties via fiber optic cable and plans to lay fiber optic cable through Western Maryland); Ryan Bentley, *Cooperative Ready to Begin Making Broadband a Reality by Early Summer*, PETOSKEY NEWS REVIEW, Apr. 23, 2008, <http://www.petoskeynews.com/articles/2008/04/23/news/doc480f396d259ba659116224.prt> (last visited May 13, 2009) (announcing plans to seek rural development loans from the USDA to fund broadband infrastructure deployment to residents and businesses in 12 rural counties in Northern Michigan); SCTC Comments at 2 (stating that it offers nearly ubiquitous DSL service, ranging in speeds from 1.5 Mbps download/512 Kbps upload to 6 Mbps download/1 Mbps upload, to a broad region that includes Salem, Oregon).

³⁰² A number of previously unserved or underserved communities have sponsored or deployed local broadband networks (consisting of either fiber, cable, or wireless networks). See *infra* notes 303–304 (listing communities that have sponsored or deployed local broadband networks); see also Allan J. Hastings Comments at 2 (stating that public development of shared digital roads, managed just as traditional roads are managed, lowers the costs for private sector service providers and creates new opportunities for start-up companies and incumbent providers that have said they cannot afford to build fiber networks in rural areas); Big Think Strategies Comments at 7 (noting no strong objection to government owned and operated infrastructure since governmental units in the United States today typically provide roads, water and sewer service, and airports as well as a great deal of gas distribution, electrical service, and health care).

³⁰³ Communities such as Minneapolis, Minnesota, Lafayette, Louisiana, and Fort Wayne, Indiana, have deployed high speed networks. See Benton Foundation Comments at 11, nn.19–20; Esme Vos, *Muniwireless Updates List of Cities and Counties with Large Wi-Fi Networks*, MUNIWIRELESS, Mar. 28, 2009, <http://www.muniwireless.com/2009/03/28/muniwireless-list-of-cities-with-wifi/> (article includes a link to the list of cities, available at <http://www.muniwireless.com/reports/Mar-28-2009-list-of-cities.pdf>).

³⁰⁴ We note that counties in rural areas such as Allegheny County, Maryland; Craven County, North Carolina; and Cambria County, Pennsylvania, are just a few that have sponsored deployment of county-wide networks. AllCoNet.org, What is AllCoNet, <http://www.allconet.org/> (last visited Apr. 29, 2009); *Craven County, North Carolina Goes Wireless: Rural Wi-Fi Connects Schools, Towns*, MUNIWIRELESS, June 6, 2008, <http://www.muniwireless.com/2008/06/06/craven-county-north-carolina-goes-wireless-rural-wi-fi-connects-schools-towns>; Cambria Connected, Introducing a New Way to Communicate in Cambria County, <http://www.cambriacconnected.net/> (last visited May 11, 2009); Melissa Block, *Widening the Internet Highway to Rural America*, NATIONAL PUBLIC RADIO, Dec. 14, 2005, <http://www.npr.org/templates/story/story.php?storyId=5053488> (last visited May 19, 2009).

provider,³⁰⁵ the potential for market distortion,³⁰⁶ and the consequences of unfair competition,³⁰⁷ others assert that government sponsorship is the best solution in rural areas where existing service providers and private entities have not invested in building broadband infrastructure.³⁰⁸ Internationally, we note that several countries have undertaken government-sponsored efforts to provide broadband services nationwide. One example is the Australian government's recent announcement that it plans to upgrade its broadband infrastructure to deliver up to 100 Mbps to 90 percent of homes and offices in Australia.³⁰⁹ Remote and sparsely populated regions of that country will receive wireless broadband service with speeds up to 12 Mbps.³¹⁰ Similarly, France's "dead zone programme," created in 2003, allows operators to use public funds to provide mobile telephony coverage ultimately to 3,000 towns in France.³¹¹ Sweden has adopted the "stadsnät" urban area network model under which a city builds and administers fiber infrastructure, which it then rents at cost to service providers that deploy their own transmission equipment.³¹²

120. A complementary government role in broadband deployment can yield advantages that a free market solution cannot achieve alone. For example, government involvement in rural broadband may increase the efficiency and reliability of local services, such as law enforcement and emergency

³⁰⁵ See Craig Dingwall, *Municipal Broadband: Challenges and Perspectives*, 56 FED. COMM. L.J. 92, 92 (2006).

³⁰⁶ See FED. TRADE COMM'N STAFF, MUNICIPAL PROVISION OF WIRELESS INTERNET 28–35 (2006), <http://www.ftc.gov/os/2006/10/V060021municipalprovwirelessinternet.pdf> (FTC REPORT).

³⁰⁷ See FTC REPORT at 30; Dingwall, *supra* note 305, at 92.

³⁰⁸ See, e.g., Art Menius Comments at 2 (urging adoption of a federal rural broadband policy that encourages local ownership of broadband infrastructure and public ownership of broadband infrastructure in areas where private entities are not forthcoming in building broadband infrastructure). We note that at least 35 states have considered limiting municipal broadband, and at least 19 states have enacted legislation specifically addressing municipal broadband. See A.H. Tapia & J.A. Ortiz, *Municipal Responses to State-Level Broadband Internet Policy 2* (Sept. 2006), available at http://web.si.umich.edu/tprc/papers/2006/554/TPRCfinal_pdf.pdf; see also, e.g., ARK. CODE ANN. § 23-17-409(b)(1) (West 2009); COLO. REV. STAT. ANN. § 29-27-201 (West 2009); FLA. STAT. ANN. § 166.047 (West 2009); IOWA CODE ANN. § 388.10 (West 2009); LA. REV. STAT. ANN. § 45:884.41, *et seq.* (2009); MICH. COMP. LAWS ANN. § 484.2252 (West 2009); MINN. STAT. ANN. § 237.19 (West 2009); MO. ANN. STAT. § 392.410 (West 2009); NEB. REV. STAT. ANN. §§ 86-575, 594 (West 2009); NEV. REV. STAT. ANN. §§ 268.086, 710.147 (West 2009); OHIO REV. CODE ANN. § 1332.01, *et seq.* (West 2009); 66 PA. CONS. STAT. ANN. § 3014(h) (West 2009); S.C. CODE ANN. § 58-9-2600, *et seq.* (2009); TENN. CODE ANN. § 7-52-601, *et seq.* (West 2009); TEX. UTIL. CODE ANN. § 54.201 (2009); UTAH CODE ANN. § 10-18-201, *et seq.* (West 2009); VA. CODE ANN. § 15.2-2160 (West 2009); WASH. REV. CODE ANN. § 54.16.330 (West 2009); WIS. STAT. ANN. § 66.0422 (West 2009). The Supreme Court has upheld the legality of regulations restricting municipal provision of broadband service. See *Nixon v. Missouri Municipal League*, 541 U.S. 125 (2004) (determining that the Communications Act does not preempt states from restricting municipal provision of telecommunications services). Some states prohibit or strictly limit municipal provision of broadband, while others impose some or all of the following: hearings, local referendums, cost-benefit analyses, feasibility studies, and strict rules against cross-subsidization.

³⁰⁹ See Esme Vos, *Australia Plans 100 Mbps to 90 Percent of Homes and Offices*, MUNIWIRELESS, Apr. 7, 2009, <http://www.muniwireless.com/2009/04/07/australia-plans-100mbps-national-network/>.

³¹⁰ *Id.* To accomplish this enormous task, the Australian government will establish a new company that will deploy the network in partnership with the private sector. The Australian government estimates that the network will cost \$31 billion and take eight years to build. *Id.*

³¹¹ Under Phase 1 of France's program, for which public funding of \$44 million is allocated for passive infrastructure, the goal is to target coverage of some 1,800 towns with 1,250 sites. See AUTORITÉ DE RÉGULATION DES COMMUNICATIONS ÉLECTRONIQUES ET DES POSTES, ARCEP ANNUAL REPORT: 2007, at 338 (2007), http://www.arcep.fr/fileadmin/uploads/tx_gspublication/rap2007-eng.zip (last visited May 13, 2009).

³¹² Big Think Strategies Comments at 14 (stating that more than thirty organizations in Stockholm have set up their own transmission equipment and built their facilities using the municipality's open fiber network).

services;³¹³ promote job growth and economic development by attracting and retaining businesses and increasing use of technology in a community;³¹⁴ provide educational benefits, both for local schools and those seeking education online;³¹⁵ and generally generate the indirect benefits to America that private employers may not consider in their cost-benefit profit assessments.³¹⁶ Finding creative solutions to overcome the hurdles presented by high deployment costs will require the development of a multi-faceted approach, including, among other things, collaborative efforts among federal, Tribal, state, and local governments, community organizations, businesses, and individuals; federal and state funding; government ownership or sponsorship; and continuation of the important contributions made by the rural cooperatives spread across this nation.

VI. OVERCOMING CHALLENGES TO RURAL BROADBAND DEPLOYMENT

121. The 2008 Farm Bill directs that this Report include recommendations “to identify how specific Federal agency programs and resources can best respond to rural broadband requirements and overcome obstacles that currently impede rural broadband deployment.”³¹⁷ Throughout this Report, we have identified how Federal agency programs can respond better and overcome obstacles that impede rural broadband deployment.³¹⁸ In this part, we provide recommendations concerning the Commission’s existing programs and resources.

122. During recent years, the Commission has not had a comprehensive strategy regarding how its programs and resources can best respond to rural broadband requirements or promote rural broadband deployment. The Commission’s approach generally has been to prevent or remove “economic” regulation of broadband services. For example, the Commission established a deregulatory environment for the provision of broadband Internet access service by classifying that service as an information service regardless of the nature of the platform over which it is provided,³¹⁹ and by

³¹³ See FTC REPORT at 20.

³¹⁴ See FTC REPORT at 22–23.

³¹⁵ See FTC REPORT at 23.

³¹⁶ Big Think Strategies Comments at 17 (“On some level this is simple economics: there are strong positive externalities to having a robust and open communications infrastructure, which means that the benefits of such an infrastructure exceed—we believe, far exceed—the returns that the operator of the network can actually extract from its users. This means that the economically and socially optimal open network will never be financed and built by private entities—again, they cannot capture the benefits that arise from such a network so they will have no incentive to build it.”).

³¹⁷ 2008 Farm Bill § 6112(a)(1)(D).

³¹⁸ See *supra* Part IV.A (discussing Promoting Interagency Coordination).

³¹⁹ *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities; Internet Over Cable Declaratory Ruling; Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, CS Docket No. 02-52, Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd 4798, 4801, para. 4 (2002) (*Cable Modem Declaratory Ruling*), *aff’d* *Nat’l Cable & Telecomms. Ass’n v. Brand X Internet Servs.*, 545 U.S. 967 (2005) (*NCTA v. Brand X*) (cable modem Internet access service); *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities; Universal Service Obligations of Broadband Providers; Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services; Computer III Further Remand Proceedings; Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review—Review of Computer III and ONA Safeguards and Requirements; Conditional Petition of the Verizon Telephone Companies for Forbearance Under 47 U.S.C. § 160(c) with Regard to Broadband Services Provided via Fiber to the Premises; Petition of the Verizon Telephone Companies for Declaratory Ruling or, Alternatively, for Interim Waiver with Regard to Broadband Services Provided via Fiber to the Premises; Consumer Protection in the Broadband Era*, CC Docket Nos. 02-33, 95-20, 98-10, 01-337, WC Docket Nos. 04-242, 05-271, Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 14853 (2005) (*Wireline Broadband Internet Access Services Order*), *aff’d* *Time Warner Telecom, Inc. v. FCC*, 507 F.3d 205 (3d Cir. 2007) (wireline broadband Internet access

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eliminating legacy regulation that had applied to facilities-based wireline providers (but not to other providers) of that service.³²⁰ Despite this generally deregulatory approach, the Commission has continued to impose regulatory obligations on broadband telecommunications services providers (although not on broadband Internet access service providers) to the extent it was needed to further important public policies.³²¹

123. The theory behind this generally deregulatory approach was that reliance on market forces, rather than regulation, was the best way to increase investment in broadband networks and make affordable broadband services available to consumers. In the *National Broadband Plan NOI*, the Commission has sought comment on competition as a mechanism to achieve the goals of the Recovery Act.³²² The results of this inquiry may require changes in specific Commission programs affecting rural broadband.

124. Because the national broadband plan is currently under consideration and is not due until February 2010, we have included here a compilation of pending Commission proceedings affecting rural broadband, including proceedings related to universal service, open network policies, spectrum access, intercarrier compensation, special access, pole attachments, tower siting, and video programming. The discussion of these proceedings here should not be construed as prejudging outcomes, which in any event must be based on the record before the Commission in those proceedings.

125. The 2008 Farm Bill requires that the Chairman of the Commission, in coordination with the Secretary of Agriculture, provide Congress with a full, updated rural broadband report two years from now.³²³ We recommend that the next Commission Chairman consider completing a status report on rural broadband approximately one year from now. This status report will help inform Congress of the Commission's progress on these proceedings and of any needed changes to the recommendations in this Report in light of additional efforts to address rural broadband issues, including the completion of the national broadband plan.

A. Universal Service Programs and Reform

126. The 1996 Act codified the historical commitment of the Commission and state regulators to promote universal service by ensuring that consumers in all regions of the nation have access to

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service); *United Power Line Council's Petition for Declaratory Ruling Regarding the Classification of Broadband over Power Line Internet Access Service as an Information Service*, WC Docket No. 06-10, Memorandum Opinion and Order, 21 FCC Rcd 13281 (2006) (*BPL-Enabled Internet Access Services Order*) (BPL-enabled Internet access service); *Appropriate Regulatory Treatment for Broadband Access to the Internet Over Wireless Networks*, WT Docket No. 07-53, Declaratory Ruling, 22 FCC Rcd 5901, 5909-10, para. 22 (2007) (wireless broadband Internet access service).

³²⁰ *Wireline Broadband Internet Access Services Order*, 20 FCC Rcd at 14899, para. 86.

³²¹ See, e.g., *Petition of AT&T, Inc. for Forbearance Under 47 U.S.C. § 160(c) from Title II and Computer Inquiry Rules with Respect to Its Broadband Services and Petition of BellSouth Corporation for Forbearance Under 47 U.S.C. § 160(c) from Title II and Computer Inquiry Rules with Respect to Its Broadband Services*, WC Docket No. 06-125, Memorandum Opinion and Order, 22 FCC Rcd 18705 (2007) (*AT&T Enterprise Broadband Forbearance Order*) (retaining statutory and regulatory requirements designed to ensure the sufficiency of federal universal service support mechanisms, promote access to telecommunications services by individuals with disabilities, protect customer privacy, and increase the effectiveness of emergency services, among other objectives).

³²² See *National Broadband Plan NOI* at para. 49.

³²³ The 2008 Farm Bill states that the "Chairman of the Federal Communications Commission, in coordination with the Secretary, shall update and evaluate the report described in subsection (a) during the third year after the date of enactment of this Act." 2008 Farm Bill § 6112(b).

affordable, quality telecommunications services.³²⁴ The 1996 Act added section 254 to the Communications Act, which directs the Commission, after consultation with the Federal-State Joint Board on Universal Service (Joint Board), to establish specific, predictable, and sufficient support mechanisms to preserve and advance universal service.³²⁵ In addition, in section 254(b), Congress provided a list of principles upon which the Commission must base policies for the preservation and advancement of universal service.³²⁶ Among other things, section 254(b) directs that quality services should be available at just, reasonable, and affordable rates; access to advanced telecommunications and information services should be provided in all regions of the nation; and consumers in all regions of the nation, including those in rural areas, should have access to telecommunications and information services that are reasonably comparable to those services provided in urban areas.³²⁷

127. To implement the universal service goals outlined in the 1996 Act, the Commission established the High-Cost Program, the Low-Income Program, the E-rate Program, and the Rural Health Care Program.³²⁸ The universal service programs are funded by contributions from telecommunications carriers providing interstate telecommunications services and from certain other providers of interstate telecommunications.³²⁹ While the universal service programs have primarily been focused on ensuring

³²⁴ Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 § 254 (1996) (codified at 47 U.S.C. § 254); see also *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Notice of Proposed Rulemaking and Order Establishing Joint Board, 11 FCC Rcd 18092 (1996). Historically, the purpose of universal service support has been to promote universally available basic telephone service at reasonable and affordable rates. Before the 1996 Act, universal service was promoted largely through implicit support mechanisms.

³²⁵ 47 U.S.C. § 254(a), (b)(5).

³²⁶ 47 U.S.C. § 254(b)(1)–(7).

³²⁷ 47 U.S.C. § 254(b)(1)–(3). Specifically, the Communications Act requires that universal service policies be based on the following principles: “(1) QUALITY AND RATES.—Quality services should be available at just, reasonable, and affordable rates. (2) ACCESS TO ADVANCED SERVICES.—Access to advanced telecommunications and information services should be provided in all regions of the Nation. (3) ACCESS IN RURAL AND HIGH COST AREAS.—Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and information services, including interexchange services and advanced telecommunications and information services, that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas. (4) EQUITABLE AND NONDISCRIMINATORY CONTRIBUTIONS.—All providers of telecommunications services should make an equitable and nondiscriminatory contribution to the preservation and advancement of universal service. (5) SPECIFIC AND PREDICTABLE SUPPORT MECHANISMS.—There should be specific, predictable and sufficient Federal and State mechanisms to preserve and advance universal service. (6) ACCESS TO ADVANCED TELECOMMUNICATIONS SERVICES FOR SCHOOLS, HEALTH CARE, AND LIBRARIES.—Elementary and secondary schools and classrooms, health care providers, and libraries should have access to advanced telecommunications services as described in subsection (h). (7) ADDITIONAL PRINCIPLES.—Such other principles as the [Federal-State Joint Board on Universal Service] and the Commission determine are necessary and appropriate for the protection of the public interest, convenience, and necessity and are consistent with this Act.” 47 U.S.C. § 254(b). The Commission adopted the additional principle that federal support mechanisms should be competitively and technologically neutral. *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Report and Order, 12 FCC Rcd 8776, 8801–02, paras. 46–48 (1997) (*Universal Service First Report and Order*).

³²⁸ In 2008, the Universal Service Administrative Company (USAC) disbursed approximately \$7.1 billion in universal service support: approximately \$4.4 billion for the High-Cost Program; approximately \$1.7 billion for the E-rate Program; approximately \$819 million for the Low-Income Program; and approximately \$49 million for the Rural Health Care Program. USAC, 2008 ANNUAL REPORT (2008) (USAC 2008 ANNUAL REPORT).

³²⁹ Section 254(d) of the Communications Act directs that “[e]very telecommunications carrier that provides interstate telecommunications services shall contribute, on an equitable and nondiscriminatory basis, to the specific, predictable, and sufficient mechanisms established by the Commission to preserve and advance universal service.” 47 U.S.C. § 254(d). Section 254(d) further provides that “any other provider of interstate telecommunications may

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the availability of telecommunications services, the Commission has made efforts to expand broadband availability through universal service policies and is considering how to reform the programs to further expand broadband availability.³³⁰ The four universal service programs currently treat the support of broadband differently. The Rural Health Care Program and the E-rate Program explicitly support the provision of broadband. The High-Cost Program indirectly supports the provision of broadband, and the Low-Income Program does not currently support broadband.

1. Rural Health Care Program

128. The Rural Health Care Program provides reduced rates for eligible rural health care providers for telecommunications and Internet services necessary for the provision of health care.³³¹ When the program was established, the Commission adopted an annual cap of \$400 million for universal service support for rural health care providers.³³² Despite modifications the Commission has made to the Rural Health Care Program, the program continues to be greatly underutilized and is not fully realizing the benefits intended by the Telecommunications Act of 1996 and the Commission's rules. For example, from 1997 to 2007, the program generally disbursed less than 10 percent of the authorized funds, and in 2008, the program disbursed slightly more than 10 percent of authorized funds.³³³

129. In 2007, in response to the underutilization of the program, the Commission established the Rural Health Care Pilot Program (Pilot Program) to provide, among other things, funding for the construction of state or regional broadband networks and for the advanced telecommunications and information services provided over those networks for health care providers.³³⁴ The goal of the Pilot Program is to stimulate the deployment of the broadband infrastructure necessary to support innovative telemedicine services to rural America. In coordination with the U.S. Department of Health and Human Services (HHS), the Pilot Program also will support the advancement of HHS's health information technology (health IT) initiatives for electronic health records and create vital broadband links for disaster preparedness and emergency response to any large-scale emergency or public health crisis.³³⁵ Under the Pilot Program, 67 projects are eligible to receive funding for telehealth networks serving 6,000 health care

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be required to contribute to the preservation and advancement of universal service if the public interest so requires.” *Id.* The Commission has determined that any entity that provides interstate telecommunications to others for a fee must contribute, based on contributors’ interstate and international end-user telecommunications revenues, to the universal service fund. *Universal Service First Report and Order*, 12 FCC Rcd at 9183–84, para. 795. The Commission also requires certain other providers of interstate telecommunications to contribute to the universal service fund. *See, e.g., Universal Service Contribution Methodology*, WC Docket Nos. 06-122, 04-36, CC Docket Nos. 96-45, 98-171, 90-571, 92-237,99-200, 95-116, and 98-170, Report and Order and Notice of Proposed Rulemaking, 21 FCC Rcd 7518 (2006) (*2006 Interim Contribution Methodology Order*) (requiring interconnected VoIP providers to contribute to the universal service fund), *aff’d in part and vacated in part on other grounds, Vonage Holdings Corp v. FCC*, 489 F.3d 1232 (D.C. Cir. 2007).

³³⁰ *See November 2008 Further Notice*, apps. A, C (seeking comment on requiring recipients of high-cost support to offer broadband services, and seeking comment on a low-income support pilot program for broadband services).

³³¹ 47 C.F.R. Part 54, Subpart G.

³³² 47 C.F.R. § 54.623; *Universal Service First Report and Order*, 12 FCC Rcd at 9141, para. 705.

³³³ USAC 2008 ANNUAL REPORT.

³³⁴ *See Rural Health Care Support Mechanism*, WC Docket No. 02-60, Order, 22 FCC Rcd 20360 (2007) (*RHC Pilot Selection Order*); *Rural Health Care Support Mechanism*, WC Docket No. 02-60, Order, 21 FCC Rcd 11111 (2006) (*2006 Rural Health Care Pilot Program Order*). The Rural Health Care Pilot Program also supports costs associated with connecting to nationwide backbone providers, Internet2 or National LambdaRail, and connecting to the public Internet. *See RHC Pilot Selection Order*, 22 FCC Rcd at 20361, para. 2.

³³⁵ *See 2006 Rural Health Care Pilot Program Order*, 21 FCC Rcd 11111.

facilities in 42 states and three U.S. territories, using broadband technology to bring state-of-the-art medical practices to isolated rural communities.³³⁶ Most recently, in April 2009, the Commission announced the approval of funding for: 1) the buildout of five networks that will link hundreds of hospitals regionally in Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, South Carolina, Wisconsin, and Wyoming; and 2) the design of a telehealth project in Alaska.³³⁷

2. E-rate Program

130. The E-rate Program provides discounts for telecommunications, Internet access, and internal connections for qualifying schools and libraries throughout the nation, including insular areas and isolated regions such as Tribal lands.³³⁸ Schools and libraries can obtain E-rate funding for broadband under either the telecommunications or the Internet access category.³³⁹ E-rate participants can also receive discounts on e-mail service; web hosting services; cabling, connectors, and related components used for eligible voice, video, and data transmission; and components used to distribute information from Internet access facilities to individual classrooms or public areas of a library.³⁴⁰

131. Since the inception of the E-rate Program, schools and libraries have received more than \$23.7 billion in funding commitments.³⁴¹ E-rate funding has provided millions of school children, teachers, and library patrons access to modern telecommunications and information services. In a study released in 2006, the National Center for Education Statistics (NCES) found that nearly 100 percent of public schools in the United States had Internet access, and 97 percent of these schools used broadband connections to access the Internet.³⁴² Today, Internet access in public schools is nearly ubiquitous; before the E-rate Program was established in 1997, only 78 percent of public schools had any Internet access at all. In 1997, only 27 percent of public school instructional classrooms had Internet access; that figure

³³⁶ See *RHC Pilot Selection Order*, 22 FCC Rcd 20360.

³³⁷ Press Release, FCC, *FCC Update on Rural Healthcare Pilot Program Initiative* (Apr. 16, 2009), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-290141A1.pdf. Of the 67 projects, 29 have developed or posted requests for proposals (RFPs) to select vendors to build out their networks, while the remaining projects are preparing their RFPs as part of the competitive bidding process. *Id.*

³³⁸ 47 C.F.R. Part 54, Subpart F; see also USAC, Schools and Libraries' Eligible Services List for Funding Year 2009, November 21, 2008, http://www.usac.org/_res/documents/sl/pdf/ESL_archive/EligibleServicesList_112108.pdf (Funding Year 2009 ESL). The eligible services list (ESL) indicates whether specific products or services are eligible to receive discounts under the E-rate Program.

³³⁹ Schools and libraries can apply discounts toward broadband connections that include digital subscriber lines (DSL), cable modems, fiber optics, integrated services digital networks (ISDN, BRI, PRI), satellite services, T1s, T2s, T3s, and fractional T1s. Funding Year 2009 ESL at 2, 3, 7.

³⁴⁰ *Id.* at 6, 7, 10, 11.

³⁴¹ See USAC, Schools and Libraries Division, <http://www.sl.universalservice.org/funding/y1/national.asp> (1998–2008 data).

³⁴² U.S. DEPT. OF EDUC., INSTITUTE OF EDUC. SCI., *INTERNET ACCESS IN U.S. PUBLIC SCHOOLS AND CLASSROOMS: 1994-2005*, at 4–5 (2006), <http://nces.ed.gov/pubs2007/2007020.pdf>. The survey also found that nearly 100% of large schools were connected to the Internet using broadband while only 94% of small schools reported using broadband connections. *Id.* at 5. Although it is likely that the percentage of small schools using dial-up has decreased since 2006, any school still using dial-up will be limited in its use of the Internet and its applications.

increased to 94 percent by 2005.³⁴³ A 2006 study found that 99 percent of public library branches are connected to the Internet, 98 percent of which offer public Internet access.³⁴⁴

132. As these figures demonstrate, the E-rate Program has been successful in connecting schools and libraries to the Internet using broadband. As those connections become obsolete or insufficient, however, the E-rate Program should continue to ensure that American schools and libraries remain competitive and on the forefront of technology. Schools will need E-rate funding for both the initial implementation of broadband access, as well as for the on-going costs to maintain and continuously improve their networks.³⁴⁵ Broadband is essential to handle the applications available today, including online distance learning and videoconferencing. One of the next steps will be to determine what level of broadband is adequate for each school's needs.

133. In some schools, broadband is an integral part of the everyday curriculum and is used by students, teachers, and administrators to access online and distance learning; online assessment, data, and other administration resources; special education; and professional development. For example, the Bering Strait School District (BSSD) in Alaska uses SchoolAccess, a satellite network that provides basic connectivity and videoconferencing.³⁴⁶ The BSSD is located in an area of coastal northwest Alaska that is about the size of Great Britain. It administers 15 schools that collectively have approximately 1,800 students.³⁴⁷ Today, BSSD has satellite connections of at least three Mbps from each school to the district office in Unalakleet that are used to create a coherent sense of community throughout the district, provide educational opportunities to students, and allow teachers and administrators to meet without having to fly between communities.³⁴⁸ Broadband has been critical to providing BSSD's students with the same high-quality educational opportunities available in non-rural communities.

3. High-Cost Program

134. The High-Cost Program is designed to ensure that consumers in rural, insular, and high-cost areas have access to telecommunications services at rates that are affordable and reasonably comparable to rates charged for similar services in urban areas.³⁴⁹ The High-Cost Program does not explicitly support the provision of broadband; however, a carrier providing broadband services indirectly receives the benefits of high-cost universal service support when its network provides both the supported voice services and broadband services.³⁵⁰

³⁴³ *Id.* at 14, 16.

³⁴⁴ INFO. USE MGMT. & POLICY INSTITUTE, COLLEGE OF INFO., FLA. STATE UNIV., PUBLIC LIBRARIES AND THE INTERNET 2006: STUDY RESULTS AND FINDINGS 1 (2006), http://www.ii.fsu.edu/projectFiles/plinternet/2006/2006_plinternet.pdf.

³⁴⁵ See STATE EDUC. TECH. DIRECTORS ASS'N, HIGH-SPEED BROADBAND ACCESS FOR ALL KIDS: BREAKING THROUGH THE BARRIERS 22–23 (2008), http://www.setda.org/c/document_library/get_file?folderId=270&name=DLFE-211.pdf.

³⁴⁶ *Id.* at 14–15.

³⁴⁷ *Id.*

³⁴⁸ *Id.*

³⁴⁹ The program allows eligible carriers who serve these areas to recover some of their operating costs from the federal universal service fund. See 47 C.F.R. Part 54, Subpart D.

³⁵⁰ The public switched network is not a single-use network, and modern network infrastructure can provide access not only to voice service, but also to data, graphics, video, and other services. The Commission's policies seek to promote the deployment of modern plant capable of providing access to advanced services. See *Federal-State Joint Board on Universal Service, Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-*

(continued....)

4. Low-Income Program

135. The Low-Income Program provides discounts on telephone installation and monthly telephone service to low-income consumers through two programs.³⁵¹ The Commission's Link Up Program provides federal support to reduce eligible consumers' initial connection charges by up to one half and the Lifeline Program reduces qualifying consumers' monthly charges.³⁵² Qualified subscribers living on Tribal lands can receive discounts of up to \$35 per month on basic monthly telephone service,³⁵³ and depending on current rates, may receive basic local phone service for as little as \$1 a month.³⁵⁴ In addition, qualified subscribers on Tribal lands may receive a one-time discount on initial installation or activation of a wireline or wireless telephone for their primary residence.³⁵⁵

136. Although the Low-Income Programs do not currently provide support for broadband services, the Commission sought comment in 2008 on establishing a Broadband Lifeline/Link Up Pilot Program to examine how the universal service Low-Income Program can be used to enhance access to broadband Internet access services for low-income Americans.³⁵⁶ Specifically, the Commission sought comment on making available \$300 million each year for three years to enable eligible telecommunications carriers to provide discounts on broadband Internet access service and the necessary access devices to low-income consumers.³⁵⁷

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Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers, Fourteenth Report and Order, Twenty-Second Order on Reconsideration, and Further Notice of Proposed Rulemaking in CC Docket No. 96-45, and Report and Order in CC Docket No. 00-256, 16 FCC Rcd 11244, 11322, para. 200 (2001) (*Rural Task Force Order*).

³⁵¹ 47 C.F.R. Part 54, Subpart E.

³⁵² The Lifeline program currently provides low-income consumers with discounts of up to \$10.00 off of the monthly cost of telephone service for a single telephone line in their principal residence, though this amount adjusts, in part, to reflect the carrier's tariffed federal subscriber line charge. See 47 C.F.R. § 54.403. Link Up provides low-income consumers with discounts of up to \$30.00 off of the initial costs of obtaining telephone service. See 47 C.F.R. § 54.411(a). Under the Commission's rules, there are four tiers of federal Lifeline support. All eligible subscribers receive Tier 1 support, which provides a discount equal to the eligible telecommunications carrier's subscriber line charge. Tier 2 support provides an additional \$1.75 per month in federal support, available if all relevant state regulatory authorities approve such a reduction. (All fifty states have approved this reduction.) Tier 3 of federal support provides one half of the subscriber's state Lifeline support, up to a maximum of \$1.75. Only subscribers residing in a state that has established its own Lifeline/Link Up program may receive Tier 3 support, and they may receive this support only if their service provider is an eligible telecommunications carrier that has all necessary approvals to pass on the full amount of this total support in discounts to subscribers. Tier 4 support provides eligible subscribers living on tribal lands up to an additional \$25 per month towards reducing basic local service rates, but this discount cannot bring the subscriber's cost for basic local service to less than \$1. See 47 C.F.R. § 54.403.

³⁵³ 54 C.F.R. § 54.403.

³⁵⁴ 54 C.F.R. § 54.409(a)(4).

³⁵⁵ 54 C.F.R. §§ 54.411; 54.415. The discount is up to 50% of the first \$60 of the installation fee. Qualified subscribers living on Tribal lands with installation or activation fees above \$60 receive an additional discount of up to \$70, bringing the total discount to a maximum of \$100. 54 C.F.R. §§ 54.411. The program also allows subscribers to pay the remaining amount that they owe on an interest-free deferred schedule.

³⁵⁶ See *November 2008 Further Notice* at para. 40; app. A, paras. 64–91; app. C, paras. 60–87.

³⁵⁷ See *id.*

5. Reform Efforts

137. The Communications Act specifies that “[u]niversal service is an evolving level of telecommunications service” that should be revisited periodically, and the Commission has been considering comprehensive universal service reform.³⁵⁸ In 2007, the Joint Board recommended including broadband service as a supported service under the High-Cost Program and proposed permitting states to use various methods to allocate available universal service funds for broadband projects to reach unserved areas, including funding broadband projects through a competitive bidding system designed to select the most efficient provider of such service.³⁵⁹ The Commission declined to adopt the recommendations of the Joint Board.³⁶⁰ In 2008, the Commission released a Further Notice seeking comment on ways to comprehensively reform the federal universal service fund.³⁶¹ For example, the Commission sought comment on requiring recipients of high-cost support to offer broadband Internet access service throughout their service areas.³⁶² In the *National Broadband Plan NOI*, the Commission also sought comment on universal service reform.³⁶³

138. Many commenters suggest that universal service should be used as a mechanism to ensure that broadband services are available in rural areas but these commenters disagree about the changes that should be made to the universal service programs.³⁶⁴ While this Report is not intended to address the merits of each of these issues, I continue to support the need for comprehensive reform of the universal service fund. It is of great interest to Congress, consumers, industry, and the Commission, and it is time for universal service to meet the challenges of the 21st century—broadband deployment—just as it did the challenge of the 20th century: telephone service. And while there are a variety of ways to comprehensively reform the system, adding broadband to both the contribution and distribution sides of the ledger, eliminating the identical support rule, and conducting effective auditing and oversight, along with a Congressional change to include intrastate as well as interstate revenue as part of the fund, would accomplish a great deal in addressing the sustainability and integrity of the fund for the long term and promote broadband in the areas served by the fund.

B. Network Openness

139. Legacy and next generation applications are converging on the communications platform we know as the Internet, and how this critical infrastructure is managed now and in the future will determine whether it remains an open platform for innovation. The positive externalities and network effects of ubiquitous broadband will not be realized if consumers are all constrained by careful bundling,

³⁵⁸ 47 U.S.C. § 254(c).

³⁵⁹ *High-Cost Universal Service Support, Federal-State Joint Board on Universal Service*, WC Docket No. 05-337, CC Docket No. 96-45, Recommended Decision, 22 FCC Rcd 20477, 20488–89, para. 47 (Fed-State Jt. Bd. 2007).

³⁶⁰ *November 2008 Further Notice* at paras. 30–37.

³⁶¹ *Id.* at para. 40, app. A, paras. 19–31, app. C, paras. 19–31.

³⁶² *Id.*

³⁶³ For example, the Commission sought comment on: (1) “what modifications [to universal service], if any should be considered as part of a national broadband plan;” (2) each program’s “effectiveness and efficiency as a mechanism to help achieve national broadband goals;” (3) “[i]f broadband services become eligible to receive high-cost and low-income support, should we also require contributions to universal service from broadband providers;” and (4) how the programs can be modified “to encourage community broadband development.” *National Broadband Plan NOI* at paras. 39–41.

³⁶⁴ See generally Embarq Comments; CTIA Comments; USA Coalition Comments; Benton Foundation Comments; and ALA Comments.

packaging, and discriminatory practices that whittle away the end-to-end structure of the public Internet. “Openness” is not just another bromide, but a principle we must tenaciously preserve.

140. The value of open networks is not a novel concept, but the Commission must act to ensure that the genius of the open Internet is not lost. Over the course of the Commission’s history, powerful network operators have argued that harm will result from any reduction in their absolute control over the network. For example, the Commission had to intervene in cases like *Carterphone* to allow even basic attachments to the telephone network that incumbents argued would compromise the entire network.³⁶⁵ As broadband networks developed, the few companies that controlled the on-ramps to the Internet could interfere with and distort the development of technology, opportunities for entrepreneurship, and the choices available to consumers. As the Commission re-categorized telecommunications services as information services, this only amplified the potential for interference. Fortunately, the Commission adopted the *Internet Policy Statement* containing the basic rights of Internet end-users to access lawful content, run applications and services, connect devices to the network, and enjoy the benefits of competition.³⁶⁶ While these protections have been critically important as a first step forward, another step is needed.

141. I have long advocated adopting a fifth principle of nondiscrimination. The principle would allow for reasonable network management but make crystal clear that the transformative power of the Internet is not to be limited by such techniques. The Commission also should establish a systematic, expeditious, case-by-case process for adjudicating claims of discrimination. Such a principle is particularly important in a rural context where a citizen may have only one option for broadband Internet access. We need to guarantee the openness of the Internet, and the Commission appropriately raised the question of how to do this in its *National Broadband Plan NOI*.³⁶⁷

C. Spectrum Access

142. Wireless service will play a critical role in ensuring that broadband reaches rural areas. Because wireless infrastructure costs are frequently less significant than comparable wired broadband deployments, wireless broadband can be an efficient means of delivering both backhaul and “last-mile” access services in rural areas.³⁶⁸ It can also enable mobility or portability. Consequently, wireless broadband service can offer cost-effective connectivity where no broadband exists, as well as complementary or competitive service where it does.³⁶⁹

³⁶⁵ *Use of the Carterfone Device in Message Toll Service*, Decision, 13 FCC 2d 420 (1968), *recon. denied*, 14 FCC 2d 571 (1968).

³⁶⁶ *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities; Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services; Computer III Further Remand Proceedings; Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer III and ONA Safeguards and Requirements; Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities Internet Over Cable Declaratory Ruling; Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, Policy Statement, 20 FCC Rcd 14986, 14987–88, para. 4 (2005).

³⁶⁷ *National Broadband Plan NOI*.

³⁶⁸ See WIRELESS BROADBAND ACCESS TASK FORCE, FCC, CONNECTED & ON THE GO 2 (2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-256693A1.pdf (WIRELESS BROADBAND ACCESS TASK FORCE REPORT); *see also* APPALACHIAN REGIONAL COMM’N, EVALUATION OF THE APPALACHIAN REGIONAL COMMISSION’S TELECOMMUNICATIONS PROJECTS: 1994–2000, at v–vii (2003), http://www.arc.gov/images/reports/telecomeval/telecom_eval.pdf (discussing reducing infrastructure costs).

³⁶⁹ See WIRELESS BROADBAND ACCESS TASK FORCE REPORT at 13–14; *see also* 2009 HIGH SPEED REPORT at 1 (explaining that information about subscribership to high-speed services, including advanced services, includes (continued....))

143. For a number of years, the Commission's spectrum policies have attempted to promote wireless broadband deployment in rural areas. These policies have included increasing spectrum availability in rural areas, and adopting licensing, technical, auction eligibility, bidding credit, and spectrum leasing rules that have sought to encourage wireless service in rural and Tribal areas.

144. *Spectrum Availability.* In recent years, the Commission has made available significant amounts of licensed spectrum that can be used to provide wireless broadband services.³⁷⁰ The Commission's actions have included, among other things, an examination of public safety needs to develop a nationwide, interoperable wireless broadband public safety network in the 700 MHz Band.³⁷¹ In addition, unlicensed spectrum use is currently permitted in several spectrum bands.³⁷² Most recently, in November 2008, the Commission adopted rules allowing unlicensed radio transmitters to operate in the unused portions of the broadcast television spectrum, the so-called "TV white spaces."³⁷³ The

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data concerning terrestrial wireless service providers, in addition to data concerning wireline telephone companies, cable system operators, and satellite service providers).

³⁷⁰ For example, the Commission auctioned 90 megahertz of Advanced Wireless Service (AWS) spectrum in the 2 GHz band beginning in 2006 and 52 megahertz of commercial spectrum in the 700 MHz Band in 2008. In addition, beginning in 2002, the Commission also auctioned 18 megahertz of commercial spectrum in the Lower 700 MHz Band. *See Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No. 02-353, Report and Order, 18 FCC Rcd 25162 (2003) (*AWS-1 Service Rules Report and Order*), modified by *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No. 02-353, Order on Reconsideration, 20 FCC Rcd 14058 (2005) (*AWS-1 Recon Order*); *700 MHz Report and Order*, 22 FCC Rcd 8064; *700 MHz Second Report and Order*, 22 FCC Rcd 15289; <http://wireless.fcc.gov/auctions/44/> (with links to later auctions of Lower 700 MHz Band licenses). In addition, beginning in 2004, the Commission restructured the 2.5 GHz Broadband Radio Service/Educational Broadband Service band plan and modified the rules for the use of that spectrum to enable the development and deployment of mobile broadband services, including WiMAX technologies. In restructuring the band plan, the Commission moved from interleaved spectrum to more cohesive, contiguous blocks of spectrum. *See Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, WT Docket No. 03-66, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165, 14270, 14271, 14272, paras. 281, 286 (2004); *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, WT Docket No. 03-66, Third Memorandum Opinion and Order and Second Report and Order, 21 FCC Rcd 5606 (2006).

³⁷¹ As envisioned by the Commission, such a network would bring the promise of broadband to all public safety entities, including those in rural areas that may not otherwise have the resources or the ability to procure broadband capabilities for themselves. The Commission is continuing to examine opportunities to utilize the 700 MHz band to enhance the ability of the public safety community to gain access to a state of the art broadband network. *See Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band*, PS Docket No. 06-229, Ninth Notice of Proposed Rulemaking, 21 FCC Rcd 14837 (2006); Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8064 (2007); Second Report and Order, 22 FCC Rcd 15289 (2007); Second Further Notice of Proposed Rulemaking, 23 FCC Rcd 8047 (2008); Third Further Notice of Proposed Rulemaking, 23 FCC Rcd 14301 (2008).

³⁷² The spectrum most commonly used by unlicensed devices in the United States is at 902-928 MHz, 2.4 GHz, and between 5.3 and 5.8 GHz. *See generally* 47 C.F.R. Part 15.

³⁷³ *Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd 16807 (2008). *See Sprint Nextel et al.* April 13, 2009 *Ex Parte* Letter at 1-2.

Commission has also adopted an innovative, non-exclusive licensing scheme in the 3650-3700 MHz band that allows multiple entrants to use the band simultaneously.³⁷⁴

145. *Technical Rules.* In addition to increasing the amount of spectrum available for wireless broadband services, the Commission has also revised its technical rules for certain spectrum bands to improve wireless coverage in rural areas.³⁷⁵ For instance, the Commission permits Cellular, Broadband Personal Communications Service (PCS), AWS, and certain 700 MHz licensees to employ twice the power in rural areas than is permitted in non-rural areas.³⁷⁶ In addition, the Commission has allowed licensees in several bands to use a power spectral density model to measure power levels,³⁷⁷ and has adopted “average” rather than “peak” measurements of power limits, which enables better services in rural areas through an ability to use increased power in most instances.³⁷⁸

146. *Service and Licensing Rules.* The Commission, in recent years, has adopted rules governing auctioned spectrum licenses that are meant to encourage broadband deployment in rural areas. These policies have included adopting smaller license sizes when creating band plans and more stringent buildout requirements for licensees.³⁷⁹ Furthermore, the Commission has provided wireless licensees with the flexibility to deploy the technologies and services that best fit their business plan and meet the

³⁷⁴ See *Wireless Operations in the 3650-3700 MHz Band; Rules for Wireless Broadband Services in the 3650-3700 MHz Band; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band; Amendment of the Commission’s Rules with Regard to the 3650-3700 MHz Government Transfer Band*, ET Docket Nos. 04-151, 98-237, 02-380, WT Docket No. 05-96, Report and Order and Memorandum Opinion and Order, 20 FCC Rcd 6502 (2005), *recon. granted in part*, Memorandum Opinion and Order, 22 FCC Rcd 10421 (2007) (*3650 Memorandum Opinion and Order*). See API Comments at 7 (stating the Commission’s recent decision regarding the 3650-3700 MHz Band is a commendable example of efficient management in a new band with registration conditions placed on licensees in that band and the accompanying protocol restrictions helping to ensure the viability of that band to multiple users in the future). The rules for this band provide for nationwide, non-exclusive, licensing of terrestrial wireless operations, and licensees must use equipment with a contention-based protocol. See *3650 Memorandum Opinion and Order*, 22 FCC Rcd at 10425, para. 11. This approach combines the benefits of the unlicensed approach, in which the number of wireless services providers is not restricted, with other elements, namely that service providers in the band must register their operations and use equipment that incorporates a contention-based protocol.

³⁷⁵ In the *Terrestrial Wireless Rural Report and Order*, the Commission found that the record supported finding, in principle, that “increasing power limits in rural areas can benefit consumers in rural areas by reducing the costs of infrastructure and otherwise making the provision of spectrum-based services to rural areas more economic.” *Terrestrial Wireless Rural Report and Order*, 19 FCC Rcd at 19126-27, para. 86.

³⁷⁶ See *id.* at 19126–35 paras. 86–104; *700 MHz Report and Order*, 22 FCC Rcd at 8099–100, para. 93.

³⁷⁷ In deciding to employ the use of power spectral density (PSD) in the 700 MHz band, the Commission adopted a general power limit of 1 kW/MHz ERP for 700 MHz base stations and a 2 kW/MHz ERP limit for 700 MHz base stations operating in rural areas. *Id.* In March 2008, the Commission extended the PSD model to the Broadband PCS and AWS-1 spectrum bands, thereby adopting a power limit of 1640 Watts EIRP/MHz in non-rural areas and 3280 Watts EIRP/MHz in rural areas. See *Biennial Regulatory Review—Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, Third Report and Order, 23 FCC Rcd 5319, 5330, para. 25 (2008) (*Streamlining and Harmonization Order*).

³⁷⁸ See *700 MHz Report and Order*, 22 FCC Rcd at 8103, para. 105; *Streamlining and Harmonization Order*, 23 FCC Rcd at 5330, para. 25.

³⁷⁹ For example, in the AWS-1 Spectrum, the Commission increased the amount of spectrum licensed on a small geographic area basis (CMAs). See *AWS-1 Recon Order*, 20 FCC Rcd 14058. In addition, in the 700 MHz Band, the Commission adopted “keep-what-you-use” rules which provide that if a licensee fails to meet its end of term benchmark, its authorization to operate will terminate automatically for those geographic areas of its license authorization in which it is not providing service, and those unserved areas will become available for reassignment. See *700 MHz Second Report and Order*, 22 FCC Rcd at 15353–54, paras. 170–74.

needs of consumers.³⁸⁰ The Commission's rules permit licensees to transfer their licenses, or partition or disaggregate their licenses, in the secondary market with Commission approval.³⁸¹ The Commission's secondary markets rules also provide flexibility to a wide array of wireless licensees, including broadband providers, to enter into spectrum leasing arrangements with other providers that seek access to spectrum in rural areas.³⁸²

147. *Bidding Credits.* To provide greater incentives for certain entities—including small rural telephone companies and small businesses that may have an interest in serving rural areas—to access spectrum, the Commission has offered bidding credits to such companies at spectrum auctions.³⁸³ In doing so, the Commission has recognized that bidding preferences provide these smaller companies with an opportunity to compete successfully against large, well-financed entities at auction, and in some cases to subsequently deploy wireless service in rural areas.³⁸⁴

148. *Tribal Land Bidding Credits.* In 2000, the Commission created Tribal Land bidding credits to assist Tribal communities with the greatest need for access to telecommunications service.³⁸⁵ The bidding credits are available to winning bidders in wireless spectrum auctions that agree to deploy facilities and provide service in certain Tribal areas,³⁸⁶ namely federally-recognized Tribal areas with

³⁸⁰ These policies have led to the development and deployment of cutting-edge mobile broadband network technologies in many areas of the country, as well as innovative, powerful, and personalized mobile broadband applications and devices. *See generally Thirteenth CMRS Competition Report*, paras. 66–67, 126–27.

³⁸¹ “Partitioning” a license refers to transferring a portion of the geographic area of a spectrum license, such as a county within a Cellular Market Area (CMA), to another entity. “Disaggregation” refers to transferring a portion of the spectrum included in a license, such as 10 megahertz of a 30 megahertz license, to another entity.

³⁸² *See generally Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, First Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 20604 (2003); *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd 17503 (2004); 47 CFR §§ 1.9001 *et seq.*

³⁸³ The Commission may provide rural telephone companies that qualify as small businesses with bidding credits. *See Amendment of Part 1 of the Commission's Rules—Competitive Bidding Procedures*, WT Docket No. 97-82, Order on Reconsideration of the Third Report and Order, Fifth Report and Order, and Fourth Further Notice of Proposed Rule Making, 15 FCC Rcd 15293, 15319–20, para. 52 (2000).

³⁸⁴ *See, e.g., Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems; Implementation of Section 309(j) of the Communications Act -- Competitive Bidding*, WT Docket No. 96-18, PR Docket No. 93-253, Memorandum Opinion and Order on Reconsideration and Third Report and Order, 14 FCC Rcd 10030, 10091, para. 112 (1999). *But see also* David Mason Comments at 2 (urging the Commission to allow licensing of WiMAX spectrum to small ISPs across the nation for free -- instead of auctioning spectrum to one large nationwide service provider who bids the most -- because a single nationwide provider of service will never get to his small town since the market is too small).

³⁸⁵ *Extending Wireless Telecommunications Services to Tribal Lands*, WT Docket No. 99-266, Report and Order and Further Notice of Proposed Rulemaking, 15 FCC Rcd at 11794, 11802, para. 22 (2000) (*TLBC First Report and Order*).

³⁸⁶ In order to obtain a bidding credit in a particular market, a winning bidder must indicate on its long-form application (FCC Form 601) that it intends to serve Tribal lands in that market. *Id.* at 11805, para. 31. Following the long-form application filing deadline, the applicant provided an additional 90 calendar days beyond the deadline to amend its application to identify the Tribal lands to be served, and provide certification from the Tribal government(s). In particular, applicants must provide certification from the applicable Tribal government that: (1) it will allow the bidder to site facilities and provide service on its Tribal Land(s), in accordance with our rules; (2) it has not and will not enter into an exclusive contract with the applicant precluding entry by other carriers, and will not unreasonably discriminate against any carrier; and (3) its Tribal Land is a qualifying Tribal Land as defined in Commission rules. In addition, at the conclusion of the grace period, the applicant was required to amend its long-

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telephone penetration rates equal to or less than 85 percent.³⁸⁷ In order to ensure that applicants awarded bidding credits actually deploy facilities and provide service to Tribal lands, the Commission requires that a licensee construct and operate its system to cover 75 percent of the population of the qualifying Tribal Land within three years of the grant of the license or face repayment penalties and, potentially, license termination.³⁸⁸

149. Despite the various efforts of the Commission to promote spectrum access in rural areas, as described above, commenters have noted that these policies have not been consistently successful in promoting rural broadband deployments. In particular, parties have noted that there remains a lack of available, affordable, and suitable spectrum for rural wireless broadband;³⁸⁹ that our secondary market rules do not always promote spectrum trading and re-use;³⁹⁰ and that backhaul costs between wireless

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form application to file a certification that it would comply with the bidding credit buildout requirement, and that it would consult with the Tribal government regarding the siting of facilities and deployment of service on the Tribal Land. *Id.* at 11805–06, para. 32. The Commission, on its own motion, subsequently extended the grace period to 180 days. A winning bidder now has 180 days to amend its long-form application to identify the Tribal Land it seeks to serve, and to provide the required certification from the Tribal government. The winning bidder also has 180 days to file a certification that it will comply with the Tribal lands buildout requirements, and consult with the Tribal government regarding the siting of facilities and deployment of service on Tribal lands. *See Extending Wireless Telecommunications Services to Tribal Lands*, WT Docket No. 99-266, Second Report and Order and Second Further Notice of Proposed Rulemaking, 18 FCC Rcd 4775, 4779 para. 10 (2003) (*TLBC Second Report and Order*); *see also* 47 C.F.R. § 1.2110(f)(3)(ii)(A) (2003).

³⁸⁷ *Extending Wireless Telecommunications Services to Tribal Lands*, WT Docket No. 99-266, Third Report and Order, 19 FCC Rcd 17652, 17659, para. 18 (2004) (*TLBC Third Report and Order*).

³⁸⁸ *TLBC First Report and Order*, 15 FCC Rcd at 11,806–07, para. 35. The Commission also requires that, at the conclusion of the three-year period, licensees file a notification of construction indicating that they have met the 75% construction requirement on the Tribal lands for which the credit was awarded. If the licensee fails to comply with any condition, it is required to repay the bidding credit plus interest 30 days after the conclusion of the construction period. In the event the licensee fails to repay the amount, the license automatically cancels. *Id.* at 11807, para. 37. Additionally, in order to verify compliance with the Tribal lands construction requirement, the Commission requires licensees to file an attachment along with their notification of construction, stating that it covers 75% of the population of the Tribal area for which the credit was awarded and providing the data to support that statement. *TLBC Second Report and Order*, 18 FCC Rcd at 4780, para.13. Finally, the Commission expressly codified penalties for failure to comply with buildout requirements, and failure to timely repay the bidding credit. *Id.* at 4781, para. 14; *see also* 47 C.F.R. § 1.2110(f)(3)(vii) (2003).

³⁸⁹ DigitalBridge Comments at 4–6; *see also, e.g.,* FiberTower *et al.* Comments at 1–2 & app. (urging the Commission to expand the amount of licensed spectrum that can be used for wireless backhaul services).

³⁹⁰ *See* API Comments at 5 (stating that secondary markets for suitable broadband spectrum are dysfunctional in that incentives for auction winners or spectrum lessors to lease, partition, or sublease spectrum in rural areas are not compelling).

points of presence are prohibitively high.³⁹¹ Commenters have also noted that further modifications to rules for power limits in rural areas would promote wireless broadband deployment in those areas.³⁹²

150. We recommend the Commission conduct a thorough inventory of the spectrum it has already licensed, examining how, why, and where it is used, and identifying distinct geographic areas where service has not been deployed or where the spectrum is being used inefficiently. The Commission could then consider various ways to redeploy this spectrum for more efficient use, including possible modifications to secondary markets rules. For example, the Commission could examine whether requiring licensees to make “good faith” efforts to negotiate with potential spectrum lessees, particularly in rural areas, would promote the development of broadband service in rural markets.³⁹³

D. Middle Mile/Special Access

151. As discussed above, an ISP providing service to subscribers in a rural area must obtain connections to a node of an Internet backbone service provider.³⁹⁴ The facilities making this connection are among those commonly referred to as “middle-mile” facilities. Many ISPs typically obtain access to these facilities by purchasing special access services from one or more incumbent LECs, wireless services providers, or other carriers. These services may be subject to tariffed rates or may be obtained pursuant to contract, depending upon the regulatory status of the provider.³⁹⁵

152. Certain commenters argue that the prices charged for access to middle-mile facilities are excessive.³⁹⁶ In 2005, the Commission released the *Special Access Order and NPRM* to broadly reexamine the special access regime for price cap carriers.³⁹⁷ The Commission asked parties to refresh

³⁹¹ See, e.g., Big Think Strategies Comments at 8 (urging the Commission to consider the need for some sort of fixed, reasonable pricing on backhaul/middle mile costs to an upstream Internet access point); ACS Comments at 3 (stating that a component of broadband sustainability is actual access to the Internet based on economically available backhaul facilities); Fibertech/KDL Comments at 9 (stating that backhaul represents an enormous cost to wireless providers and can be prohibitively expensive in rural areas). We also note that roundtable participants at the March 19, 2009 NTIA/RUS Public Meeting about the Broadband Technology Opportunities Program explained that, in some areas, backhaul costs were the reason communities were unserved. See, e.g., John Rose, President of OPASTCO, Remarks at the U.S. Dep’t of Commerce Roundtable on Rural and Unserved Areas (Mar. 19, 2009) (transcript available at http://www.ntia.doc.gov/broadbandgrants/090319/NTIA_031909_1445_1615_session.pdf).

³⁹² See, e.g., New America Foundation Comments at 3–5 (arguing that TV “whitespaces” rules should allow variable power limits for rural areas); WISPA Comments at 5 (stating that the Commission should be favorably disposed to quickly grant waiver requests seeking relief from power limits or other technical parameters in rural areas); and Main Street Broadband Comments at 2 (recommending that the Commission raise the power limits for 3.65 GHz operations in rural areas allowing service providers to reach more customers using less infrastructure).

³⁹³ The Commission has noted the potential for a “good faith” negotiation process in recent spectrum rulemaking proceedings. See *Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band*, WT Docket No. 07-195, Notice of Proposed Rulemaking, 22 FCC Rcd 17035, 17090 para. 131 (2007) (seeking comment on whether requiring licensees to make “good faith” efforts to negotiate with potential spectrum lessees could help increase access to spectrum, including in rural areas). Cf. *700 MHz Report and Order*, 22 FCC Rcd at 8086–87 paras. 53–54 (declining to adopt rules requiring licensees to make “good faith” efforts to negotiate based, in part, on other incentives under the rules to enter into spectrum leasing arrangements).

³⁹⁴ See *supra* Part V.D (Addressing Network Costs).

³⁹⁵ See generally 47 C.F.R. Parts 61, 69.

³⁹⁶ See, e.g., New America Foundation Comments at 1, 5; GCI Comments at 3; and Alaska Commission Comments at 5.

³⁹⁷ *Special Access Order and NPRM*, WC Docket No. 05-25, RM-10593, Order and Notice of Proposed Rulemaking, 20 FCC Rcd 1994, 1994, para. 1 (2005).

the record in this *Special Access Reform* proceeding in 2007.³⁹⁸ Numerous price cap carriers have received relief from the price cap regime, in the form of pricing flexibility or forbearance relief, for certain special access services that could be used to provide middle-mile connectivity.³⁹⁹ The issues raised in the *Special Access Reform* proceeding and the forbearance relief discussed above directly affect the rates that price cap carriers may charge for access to middle-mile and other dedicated facilities for various types of broadband providers. We recommend that the Commission consider the impact special access prices have on rural broadband deployment and affordability as a part of its overall review of special access rates in the *Special Access Reform* proceeding.

153. Some commenters suggest that wireless backhaul could provide a middle-mile alternative to wireline special access services in rural areas.⁴⁰⁰ In its *Second Report and Order* in the *White Spaces* proceeding, the Commission determined that fixed unlicensed TV band devices (TVBDs) will be allowed to provide wireless broadband services (e.g., wireless Internet access) and other services using multiple vacant TV channels and will be permitted to operate on a fixed, point-to-point, or point-to-multipoint basis.⁴⁰¹ The Commission decided to limit fixed unlicensed TVBDs to a peak transmitter output power of one watt with a maximum antenna gain of 6 decibels isotropic (dBi) and require that transmitter power be reduced by the same amount in decibels (dB) that the maximum antenna gain exceeds 6 dBi, allowing fixed unlicensed TVBDs to operate with the equivalent of 4 watts Equivalent Isotropic Radiated Power (EIRP).⁴⁰² The Commission determined that these power levels would allow some improved coverage for wireless broadband service providers. The Commission also found that higher power levels would increase the risk of interference in congested areas and that it was prudent to set power limits at levels that would minimize the risk of interference to authorized TV band users. It was unclear that the current rules would provide for middle-mile coverage. However, recognizing that there are advantages, such as reduced infrastructure costs and increased service range, to operation of unlicensed TVBDs at even higher power levels, the Commission noted that it would further explore through a separate Notice of Inquiry whether higher powered unlicensed operation might be accommodated in the TV white spaces in rural areas.⁴⁰³

³⁹⁸ *Parties Asked to Refresh Record in the Special Access Notice of Proposed Rulemaking*, WC Docket No. 05-25, RM-10593, Public Notice, 22 FCC Rcd 13352 (2007).

³⁹⁹ See, e.g., *Petition of AT&T Inc. for Forbearance under 47 U.S.C. § 160(c) from Title II and Computer Inquiry Rules with Respect to its Broadband Services*, WC Docket No. 06-125, Memorandum Opinion and Order, 22 FCC Rcd 18705 (2007); see also, e.g., Joint Statement of Chairman Kevin J. Martin and Commissioner Deborah Taylor Tate, *Petition of the Verizon Telephone Companies for Forbearance under 47 U.S.C. § 160(c) from Title II and Computer Inquiry Rules with Respect to their Broadband Services*, WC Docket No. 04-440 (Mar. 20, 2006) (discussing Verizon's "deemed granted" petition). Verizon's "deemed granted" petition was upheld in *Sprint Nextel Corp. v. FCC*, 508 F.3d 1129 (D.C. Cir. 2007).

⁴⁰⁰ We note, however, that unfavorable weather conditions such as rain and wind can adversely affect the capacity of these transmissions for wireless backhaul using certain spectrum bands (such as 24 GHz and 39 GHz). See FCC Bulletin 70, Millimeter Wave Propagation Spectrum Management Implications (July 1997). In areas with irregular terrain, intermediate repeaters that ensure "line-of-sight" connectivity between transmitters and receivers are an indispensable part of any wireless backhaul system. See *supra* Part V.A (discussing technological considerations).

⁴⁰¹ *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04-186, 02-380, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd 16807, 16847, paras. 104–05 (2008).

⁴⁰² *Id.* at para. 105.

⁴⁰³ *Id.* at para. 106. See also Statement of Commissioner Michael J. Copps, *id.* at 16928; Statement of Commissioner Jonathan S. Adelstein, *id.* at 16930; Statement of Commissioner Robert M. McDowell, *id.* at 16932; and Statement of Commissioner Deborah Taylor Tate, *id.* at 16935; see also Fibertech/KDL Comments at 9 (asserting that wireless backhaul can reduce cellular companies' special access costs by 90%). See generally Sprint Nextel *et al.* April 13, 2009 *Ex Parte* Letter.

154. We recommend that the Commission consider additional actions to address middle-mile connectivity as it analyzes the records being developed in open proceedings at the Commission.

E. Intercarrier Compensation

155. Interconnection arrangements between carriers are currently governed by a complex system of intercarrier compensation regimes. Critics of the existing regimes argue that they create regulatory arbitrage opportunities that distort the marketplace and impede the deployment of broadband facilities.⁴⁰⁴ The Commission's efforts to develop a more unified intercarrier compensation regime began in 2001, with the release of the *Intercarrier Compensation NPRM*.⁴⁰⁵ These efforts have included a *Further NPRM*,⁴⁰⁶ additional rounds of comments,⁴⁰⁷ and, most recently, efforts to adopt a comprehensive approach to universal service and intercarrier compensation reform.⁴⁰⁸ The record assembled on comprehensive reform is extensive, the issues are difficult, and agreement on solutions has proven elusive. We believe a critical factor in evaluating any specific set of proposed reforms should be the effect they will have on the deployment of broadband services in rural areas.

F. Access to Poles and Rights of Way

156. Congress first directed the Commission to ensure that the rates, terms, and conditions for pole attachments by cable television systems are just and reasonable in 1978 when it added section 224 to the Communications Act.⁴⁰⁹ The 1996 Act expanded the reach of section 224 to grant attachers an affirmative right to access utility poles.⁴¹⁰ Congress also added "telecommunications carrier" as a category of attacher.⁴¹¹ The 1996 Act specified separate rate formulas for cable operators and telecommunications carriers,⁴¹² and permitted electric utilities to deny access, on a nondiscriminatory basis, where there is insufficient capacity and for reasons of safety, reliability, and generally applicable engineering purposes.⁴¹³ When the Commission implemented section 224's new access provision,⁴¹⁴ it

⁴⁰⁴ *November 2008 Further Notice* at paras. 3, 23–28.

⁴⁰⁵ *Developing a Unified Intercarrier Compensation Regime*, CC Docket No. 01-92, Notice of Proposed Rulemaking, 16 FCC Rcd 9610 (2001) (*Intercarrier Compensation NPRM*).

⁴⁰⁶ *Developing a United Intercarrier Compensation Regime*, CC Docket No. 01-92, Further Notice of Proposed Rulemaking, 20 FCC Rcd 4685 (2005) (*Intercarrier Compensation Further NPRM*) (seeking comment on a number of specific comprehensive reform proposals and alternative reform measures that would affect how intercarrier costs are recovered from end-users, carriers and universal service mechanisms).

⁴⁰⁷ *Comment Sought on Amendments to the Missoula Plan Intercarrier Compensation Proposal to Incorporate a Federal Benchmark Mechanism*, CC Docket No. 01-92, Public Notice, 22 FCC Rcd 3362 (WCB 2007). *Comment Sought on Missoula Intercarrier Compensation Reform Plan*, CC Docket No. 01-92, Public Notice, 21 FCC Rcd 8524 (WCB 2006).

⁴⁰⁸ *November 2008 Further Notice*.

⁴⁰⁹ Pole Attachment Act of 1978, Pub. L. No. 95-234, 92 Stat. 33 (1978).

⁴¹⁰ Before 1996, section 224 did not guarantee cable television systems the right to attach to utility poles but merely provided that where cable television systems were able to obtain such attachments, the rates, terms, and conditions must be just and reasonable.

⁴¹¹ 47 U.S.C. § 224(a)(4).

⁴¹² *See* 47 U.S.C. § 224(d), (e).

⁴¹³ 47 U.S.C. § 224(f)(2).

⁴¹⁴ *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996; Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers*, CC Docket Nos. 96-98, 95-

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adopted a few broad policy guidelines and rules of general applicability, but concluded that the reasonableness of particular conditions of access imposed by a utility should be resolved on a case-specific basis.⁴¹⁵

157. In 2007 the Commission issued the *Pole Attachments NPRM* to comprehensively review these issues.⁴¹⁶ In the *Pole Attachments NPRM*, the Commission tentatively concluded that all attachments used to provide broadband Internet access services should be subject to a single rate formula, regardless of the kind of company (e.g., cable operator, telecommunications carrier) providing those services.⁴¹⁷ In the pending *Pole Attachments NPRM* proceeding, the Commission also sought comment on the interplay between section 224 pole attachment regulation and Congress's intention in section 706 to promote broadband infrastructure deployment.⁴¹⁸ Timely and reasonably priced access to poles and rights of way is critical to the buildout of broadband infrastructure in rural areas. We recommend that the Commission consider this factor in analyzing the record in the *Pole Attachments NPRM* proceeding.

G. Tower Siting

158. Wireless broadband development in rural areas will depend in part on the ability of providers to access towers and other structures for the deployment of their network facilities, either through new tower construction or collocation on existing towers or other structures. For instance, one study concludes that, in order to achieve ubiquitous mobile broadband coverage, approximately 16,000 new towers will need to be constructed, disproportionately in rural areas.⁴¹⁹ We note that there are several open Commission proceedings that may affect the pace or cost of tower construction.⁴²⁰

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185, First Report and Order, 11 FCC Rcd 15449, 16058–107, paras. 1119–240 (1996) (*Local Competition Order*) (Part XI.B. “Access to Rights of Way”).

⁴¹⁵ *Id.* at 16067–68, para. 1143. *See generally* 47 C.F.R. §§ 1.1403–1418 (section 224 complaint rules). In addition, under current Commission rules, an attacher may execute a pole attachment agreement with a utility, and then later file a complaint challenging the lawfulness of a provision of that agreement. *See, e.g., S. Co. Svcs., Inc. v. FCC*, 313 F.3d 574, 582–84 (D.C. Cir. 2002).

⁴¹⁶ *Implementation of Section 224 of the Act; Amendment of the Commission's Rules and Policies Governing Pole Attachments*, WC Docket No. 07-245, RM-11293, RM-11303, Notice of Proposed Rulemaking, 22 FCC Rcd 20195 (2007) (*Pole Attachments NPRM*).

⁴¹⁷ *See Pole Attachments NPRM*, 22 FCC Rcd at 20209, para. 36. In the *Pole Attachments NPRM*, the Commission also tentatively concluded that this broadband rate should fall within the established statutory rates. *See* 47 U.S.C. § 224(d)–(e).

⁴¹⁸ *See Pole Attachments NPRM*, 22 FCC Rcd at 20205–06, para. 25. The Commission stated that “[s]ection 706 of the 1996 Act directs us to promote the deployment of broadband infrastructure, and this directive leads us to separate out those pole attachments that are used to offer broadband Internet access service from those used for other services.” *Id.* at 20209, para. 36.

⁴¹⁹ *See* CTIA Comments, WC Docket No. 05-337, Attach. A at 20 (filed Apr. 17, 2008) (“States with lower population density require more new site investment rather than augmentation of existing network assets. More than 90% of the estimated investment for Alaska, Idaho, Montana, Nevada, and Wyoming is Greenfield or new site investment.”).

⁴²⁰ For instance, in July 2008, CTIA filed a petition for declaratory ruling requesting that the Commission clarify provisions of the Communications Act regarding state and local review of wireless facility siting applications. *Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review and to Preempt under Section 253 State and Local Ordinances that Classify All Wireless Siting Proposals as Requiring a Variance*, Petition for Declaratory Ruling, WT Docket No. 08-165 (filed July 11, 2008). In 2006, the Commission sought comment on whether it should impose additional requirements on the construction of new communications towers to reduce the number of migratory bird collisions with such towers. *Effects of Communications Towers on*
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H. Video Programming

159. Access to video programming is often an important element in a customer's decision to purchase broadband service. Accordingly, access to video programming could become an issue that has an impact on the potential competitiveness of the service offerings of rural broadband providers and thus on rural broadband deployment.

160. The Commission has several ongoing proceedings examining the video programming marketplace. For instance, on January 16, 2009, the Commission requested data on the status of competition in the market for the delivery video programming for 2007; similar data for years 2008 and 2009 were requested on April 9, 2009.⁴²¹ In addition, the Commission has ongoing proceedings on program access and program carriage requirements, both of which can affect the ability of rural multichannel video programming distributors (MVPDs) to provide video programming.⁴²² We recommend that when addressing these issues, the Commission consider the impact of any actions it may take on rural broadband deployment.

VII. CONCLUSION

161. Since January, the Obama administration has taken a proactive, leadership role in broadband-related matters, and the federal government has begun to develop a coordinated approach. The Recovery Act allocated money for broadband development and also directed the Commission to prepare a national broadband plan. We hope that this Report also makes a useful contribution to the national broadband plan. Infrastructure deployment is something Americans do well; it plays to our national strengths. We have built out canals, bridges, electricity, telephone service, roads, and highways. Now, with much history to learn from and with an array of technological resources at our disposal, we can and will do it again.

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Migratory Birds, WT Docket No. 03-187, Notice of Proposed Rulemaking, 21 FCC Rcd 13241, 13241, 13256, paras. 1, 32 (2006). The Commission also is presently reviewing its rules and procedures regarding the process for environmental impact assessment of registered antenna structures pursuant to a remand from the United States Court of Appeals for the District of Columbia Circuit. See *Am. Bird Conservancy, Inc. v. FCC*, 516 F.3d 1027 (D.C. Cir. 2008); see also, *Wireless Telecommunications Bureau Seeks Comment on Petition for Expedited Rulemaking and Other Relief Filed on Behalf of American Bird Conservancy, Defenders of Wildlife and National Audubon Society Regarding Commission Implementation of the National Environmental Policy Act, the Endangered Species Act, and the Migratory Bird Treaty Act*, WT Docket Nos. 08-61, 03-187, Public Notice, DA 09-904 (WTB rel. Apr. 29, 2009).

⁴²¹ See *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, MB Docket No. 07-269, Notice of Inquiry, 24 FCC Rcd 75 (2009); Supplemental Notice of Inquiry, 24 FCC Rcd 4401 (2009).

⁴²² See *Implementation of the Cable Television Consumer Protection Act of 1992, Development of Competition and Diversity in Video Programming Distribution: Section 628(c)(5) of the Communications Act: Sunset of Exclusive Contract Prohibition; Review of the Commission's Program Access Rules and Examination of Program Tying Arrangements*, MB Docket Nos. 07-29, 07-198, Report and Order and Notice of Proposed Rulemaking, 22 FCC Rcd 17791 (2007).

APPENDIX A

**List of Commenters
GN Docket No. 09-29**

Commenter	Abbreviation
Access Humboldt	Access Humboldt
Alaska Communications Systems	ACS
Allan J. Hastings	Allan J. Hastings
AlphaStar International, Inc.	Alphastar
American Cable Association	ACA
American Farm Bureau Federation	AFBF
American Homeowners Grassroots Alliance	AHGA
American Library Association	ALA
American Petroleum Institute	API
Amateur Radio Relay League, Inc.	ARRL
Art Menius	Art Menius
AT&T Inc.	AT&T
Benton Foundation	Benton Foundation
Big Think Strategies	Big Think Strategies
Brian Wanless	Brian Wanless
Bhawana Sharma	Bhawana Sharma
California Emerging Technology Fund	CETF
Cisco Systems, Inc.	Cisco
Common Sense Media, Center for Safe and Responsible Internet Use, Children Now, The Children's Partnership, Enough is Enough, ETPRO/C3 Institute, Family Online Safety Institute, Internet Keep Safe Coalition, LOOKBOTHWAYS Inc., National Institute on Media and the Family, and Web Wise Kids	Common Sense Media <i>et al.</i>
City of Shafter, CA	City of Shafter
Commonwealth of Massachusetts Department of Telecommunications and Cable	Massachusetts Commission
Commonwealth of Pennsylvania	Pennsylvania
Connected Nation, Inc.	Connected Nation
Consumer Federation of America and Consumers Union	CFA/CU
CTIA—The Wireless Association®	CTIA
David Mason (on behalf of Skylight Associates)	David Mason
Dero Forslund	Dero Forslund
DigitalBridge Communications Corp.	DigitalBridge
Edyael Casaperalta	Edyael Casaperalta
Embarq	Embarq
Expand Networks, Inc.	Expand Networks
Fergus County, Montana	Fergus County, MT
FiberTower Corporation, Rural Telecommunications Group, Inc., COMPTel, and Sprint Nextel Corporation	FiberTower <i>et al.</i>
Fibertech Networks, LLC and Kentucky Data Link, Inc.	Fibertech/KDL
Frank Odasz (on behalf of Lone Eagle Consulting)	Frank Odasz

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General Communication, Inc.	GCI
Halo Wireless	Halo
Harris Corporation	Harris
HierComm, Inc.	HierComm
iClick2Media, Inc.	iClick2Media
Independent Telephone & Telecommunications Alliance	ITTA
Iowa Telecommunications Services, Inc.	Iowa Telecom
Jay April	Jay April
Jim Miller	Jim Miller
Joseph Schroeder	Joseph Schroeder
Joyce Hospodar	Joyce Hospodar
Kodiak-Kenai Cable Company, LLC	KKCC
Link Shadley (on behalf of representatives and broadband advocates in North Central Oregon)	Link Shadley
Liz McGeachy	Liz McGeachy
M2Z Networks, Inc.	M2Z
Main Street Broadband LLC	Main Street Broadband
Mark Bayliss (on behalf of Visual Link Internet)	Mark Bayliss
Mary Wildfire	Mary Wildfire
Michigan Public Service Commission	Michigan Commission
Microsoft Corporation	Microsoft
Mimi Pickering	Mimi Pickering
Miriam Lederer	Miriam Lederer
Minority Media and Telecommunications Council	MMTC
MSS/ATC Coalition	MSS/ATC Coalition
National Association of State Utility Consumer Advocates	NASUCA
National Association of Telecommunications Officers and Advisors and the National Association of Counties	NATOA/NACo
National Association of Tower Erectors	NATE
National Cable & Telecommunications Association	NCTA
National Exchange Carrier Association, Inc.	NECA
National Rural Electric Cooperative Association	NRECA
National Rural Telecommunications Cooperative	NRTC
National Telecommunications Cooperative Association	NTCA
Nebraska Public Service Commission	Nebraska Commission
New America Foundation	New America Foundation
New Mexico Media Literacy Project	NMMLP
New York State Office for Technology and the New York Public Service Commission	New York Commission
Nicholas John Slater	Nicholas Slater
Nickolaus E. Leggett	Nickolaus E. Leggett
Office of Advocacy, U. S. Small Business Administration	SBA
Open Range Communications Inc.	Open Range
Organization for the Promotion and Advancement of Small Telecommunications Companies	OPASTCO
PCIA—The Wireless Infrastructure Association and The DAS Forum	PCIA/DAS
Personal Broadband Industry Association	PBIA

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PocketiNet Communications	PocketiNet
QUALCOMM Incorporated	Qualcomm
Regulatory Commission of Alaska	Alaska Commission
Rob Glidden	Rob Glidden
Rural Broadband Policy Group (Center for Rural Strategies, Appalshop, Access Humboldt, the Benton Foundation, the California Center for Rural Policy, and the Main Street Project)	Rural Broadband Policy Group
Rural Fiber Alliance	RFA
Rural Iowa Independent Telephone Association	RIITA
Rural Telecommunications Alliance	RTA
Rural Telecommunications Group, Inc.	RTG
Sacred Wind Communications, Inc.	Sacred Wind
Sasha Costanza Chock	Sasha Costanza-Chock
Satellite Industry Association	SIA
Shel Anderson	Shel Anderson
Source Communications of America, LLC	Source Communications
Sprint Nextel Corporation	Sprint Nextel
Standing Rock Sioux Tribe	Standing Rock Sioux Tribe
State Members of the Federal-State Joint Board on Universal Service	Joint Board
State Members of the Federal-State Joint Conference on Advanced Services	Joint Conference
Stayton Cooperative Telephone Company	SCTC
Stephouse Networks	Stephouse Networks
Telecommunications Industry Association	TIA
Texas Statewide Telephone Cooperative, Inc.	TSTCI
Tim Marema	Tim Marema
Todd M. Jagger	Todd Jagger
Todd Starling	Todd Starling
Tom Jacobson	Tom Jacobson
TracFone Wireless, Inc.	TracFone
United States Postal Service	USPS
United States Telecom Association	USTA
Universal Service for America Coalition	USA Coalition
Valerie Fast Horse (on behalf of Coeur d'Alene Tribe)	Valerie Fast Horse
Verizon Communications Inc. and Verizon Wireless	Verizon
Vickie Edwards (on behalf of InLine)	Vickie Edwards
WildBlue Communications, Inc. and Intelsat Corporation	WildBlue/Intelsat
Windstream Communications, Inc.	Windstream
Wireless Internet Service Providers Association	WISPA
XO Communications, LLC and Nextlink Wireless, Inc.	XO/Nextlink
Yaana Technologies, LLC	Yaana

APPENDIX B

Selected Federal Programs Addressing Broadband Access

Federal Agency	Description of Program
Federal Communications Commission	Manages several universal service fund programs that assist in broadband deployment: 1. <i>Rural Health Care Program</i>—funds broadband access for rural health care centers; 2. <i>E-rate Program</i>—provides grants for broadband to schools and libraries; 3. <i>High Cost Program</i>—does not explicitly fund broadband infrastructure, but subsidies can be used to upgrade existing telephone networks.
Department of Agriculture (USDA) Rural Utilities Service (RUS)	Administers several programs addressing broadband including: 1. <i>Rural Telephone Loan and Loan Guarantee Program</i>—provides loans and loan guarantees for telephone voice service, but requires funding recipients to provide DSL broadband at a rate of at least 1 Mbps; 2. <i>Distance Learning and Telemedicine Loans and Grants</i>—provides seed money for loans and grants to rural community facilities (e.g., schools, libraries, hospitals) for advanced telecommunications systems that can provide health care and educational benefits to rural areas; 3. <i>Rural Broadband Access Loan and Loan Guarantee Program</i>—provides loans and loan guarantees for facilities and equipment providing broadband service in rural communities; 4. <i>Community Connect Broadband Grants</i>—provides grants to applicants proposing to provide broadband service on a “community-oriented connectivity” basis to rural communities of fewer than 20,000 inhabitants.
Department of Commerce National Telecommunications Information Administration (NTIA)	Manages several programs and projects addressing broadband including: 1. <i>Broadband Technology Opportunities Program</i>—provides grants to service providers to increase access and adoption of broadband infrastructure and services; 2. <i>Public Telecommunications Facilities Program</i>—provides grants for planning, acquiring, installing and modernizing public telecommunications facilities through its; 3. <i>Public Safety Interoperable Communications Grant Program</i>—provides funding to states and territories to enable and enhance public safety agencies’ interoperable communications capabilities; 4. Coordinating federal rights of way for telecommunications infrastructure projects with other agencies.
Economic Development Administration	<i>Investments for Public Works and Economic Development Facilities</i>—provides grants to economically distressed areas for construction of public facilities and infrastructure, including broadband deployment and other types of telecommunications enabling projects.

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Department of Education Office of Elementary and Secondary Education	<i>Education Technology State Grants</i> —provides grants to state education agencies for development of information technology to improve teaching and learning in schools.
Office of Assistant Secretary for Educational Research and Improvement	<i>Ready to Teach Program</i> —provides grants to carry out a national telecommunication-based program to improve the teaching in core curriculum areas.
Office of Special Education and Rehabilitative Services	<i>Technology and Media Services for Individuals with Disabilities</i> —supports the development and application of technology and education media activities for disabled children and adults.
Department of Energy	Required to spend \$4.5 billion to modernize the electric grid, which will likely include some broadband for Smart Grid. See Recovery Act, Pub. L. No. 111-5, 123 Stat. 115, 133 (2009)
Environmental Protection Agency	<i>Exchange Network Grant Program</i> —provides funding to states, territories, and federally recognized Indian Tribes to support the development of an Environmental Information Exchange Network, including broadband infrastructure.
Department of Health and Human Services Health Resources and Services Administration	Administers several programs addressing broadband including: 1. <i>Telehealth Network Grant Program</i>—provides grants to develop sustainable telehealth programs and networks in rural and frontier areas, and in medically underserved areas and populations. Grantees are required to apply for the Commission’s universal service funds; 2. <i>Telehealth Resource Center Grant Program</i>—provides grant funds for regional centers to assist health care providers in the development of their Telehealth services, including decisions regarding the purchase of advanced telecommunications services; 3. <i>Licensure Portability Grant Program</i>—provides grant support for state professional licensing boards to carry out programs under which the boards of various states cooperate to develop and implement State policies to reduce the statutory and regulatory barriers to telemedicine.
National Library of Medicine, National Institute of Health	<i>Medical Library Assistance Program</i> —provides funds to strengthen library and information services, facilitate access to and delivery of health science information, and plan and develop advanced information networks.
Department of Housing and Urban Development	Administers several programs addressing broadband including: 1. <i>Community Development Block Grants</i>— provides loans to deploy broadband networks and make them affordable for low to moderate income residents; 2. <i>Indian Community Development Grants</i>—funds broadband technology infrastructure projects.
Department of the Treasury	Distributes grants for Smart Grid investments, which includes a broadband component. See Recovery Act, Pub. L. No. 111-5, § 405, 123 Stat. 115, 144 (2009)
Department of Transportation Research and Innovative Technology Administration	<i>Next Generation (NG9-1-1) Initiative</i> —a Research and Development project that will define a system architecture for emergency communication that enables the transmission of voice, data or video from different types of communication devices to Public Safety Answering Points (PSAPs) and onto emergency responder networks. The NG9-1-1 Initiative will also develop a transition plan that considers responsibilities, costs, schedule and benefits for deploying this architecture.

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National Foundation on the Arts and the Humanities Institute of Museum and Library Services, Office of Library Services	Administers several programs addressing broadband including: 1. <i>State Library Program</i>— provides grants to state library administrative agencies for promotion of library services that provide all users access to information through State, regional, and international electronic networks; 2. <i>Native American and Native Hawaiian Library Services</i>—supports library services that include linking libraries to electronic networks.
Appalachian Regional Commission	Provides project grants for Appalachian communities to support the physical infrastructure necessary for economic development and improved quality of life
Delta Regional Authority	Provides project grants to support self-sustaining economic development of eight states in the Mississippi Delta Region
Denali Commission	Provides grants through a federal and state partnership designed to provide critical infrastructure and utilities throughout Alaska, particularly in distressed communities.

* This non-comprehensive list was prepared using information provided in Congressional Research Service, *Broadband Internet Access and the Digital Divide: Federal Assistance Programs*, RL30719, Tables 1 and 2 (Mar. 19, 2009), available at http://assets.opencrs.com/rpts/RL30719_20090319.pdf.

** For additional information on federal agency broadband programs, see Interagency Questionnaire Responses, attached to Letter from Kathy D. Smith, Chief Counsel, NTIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 09-29 (filed May 18, 2009).



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