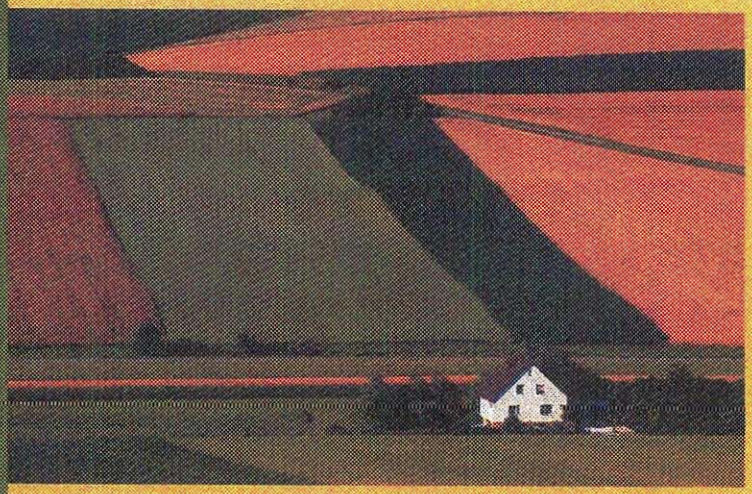

Bringing Broadband to Rural America

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

May 22, 2009

TABLE OF CONTENTS

I. INTRODUCTION 1

II. OVERVIEW OF RECOMMENDATIONS 5

III. BACKGROUND 7

A. Rural Broadband: Why it Matters 7

B. The State of Broadband in Rural Areas 12

C. America Overcomes Its Infrastructure Challenges 15
1. The Postal System and Newspapers 15
2. The Transcontinental Railroad 16
3. Rural Electrification 16
4. The Interstate Highway System 17
5. The Internet and Internet Backbone 18

D. Recent Legislative Developments 20
1. 2008 Farm Bill—Rural Broadband Strategy 20
2. BDIA—Improving the Collection of Broadband Data 21
3. Recovery Act—National Broadband Plan 21

IV. COORDINATION OF RURAL BROADBAND EFFORTS 22

A. Promoting Interagency Coordination 25
1. Federal Interagency Coordination 26
2. Additional Coordination 26

B. Streamlining, Improving, and Coordinating Existing Federal Programs 31
1. Efficient Use of Government Funds and Resources 31
2. Coordinating Program Criteria 32
3. Government Websites 32
4. Delay Caused by Other Federal Requirements 33

V. ASSESSING RURAL BROADBAND NEEDS 33

A. Technological Considerations 33

B. Assessment of Broadband Deployment 38
1. Broadband Data Collection 38
2. Broadband Mapping 43

C. Stimulating and Sustaining Demand for Broadband 44

D. Addressing Network Costs 48

VI. OVERCOMING CHALLENGES TO RURAL BROADBAND DEPLOYMENT 54

A. Universal Service Programs and Reform 55
1. Rural Health Care Program 57
2. E-rate Program 58

3. High-Cost Program 59
4. Low-Income Program 60
5. Reform Efforts 61

B. Network Openness 61

C. Spectrum Access 62

D. Middle Mile/Special Access 67

E. Intercarrier Compensation 69

F. Access to Poles and Rights of Way 69

G. Tower Siting 70

H. Video Programming 71

VII. CONCLUSION 71

APPENDIX A—List of Commenters
APPENDIX B—Selected Federal Programs Addressing Broadband Access

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

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[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_Part1_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* INDUST. 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

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[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_faq_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=2889DCE2E86B04AD9EB296EC533 07AB1?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

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[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

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[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. POCIASK, 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.

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[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,

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[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

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[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

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[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

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[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.

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[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/idocs/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]

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[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

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[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).