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Public Interest Comment on
National Broadband Plan Notice of Inquiry[1]

GN Docket No. 09-51

The Regulatory Studies Program (RSP) of the Mercatus Center at George Mason University is dedicated to advancing knowledge of the impact of regulation on society. As part of its mission, RSP conducts careful and independent analyses employing contemporary economic scholarship to assess rulemaking proposals from the perspective of the public interest. Thus, this comment on the Federal Communications Commission's (FCC's) Notice of Inquiry does not represent the views of any particular affected party or special interest group, but is designed to assist the commission as it seeks to develop a national broadband plan that advances consumer welfare and overall national interests.

I. Introduction

The Recovery Act requires the Federal Communications Commission to produce a national broadband plan. The plan must outline how the United States will seek to ensure that all Americans have access to broadband, in order to advance a list of specified public policy objectives.[2] In the current Notice of Inquiry, the FCC seeks comment on quantifiable outcome measures and alternative strategies that would help accomplish the policy objectives enumerated in the section of the Recovery Act that requires the FCC to produce a national broadband plan.[3]

We welcome the opportunity to respond. Mercatus Center researchers have conducted extensive analysis of outcome measurement and the effects of alternative regulatory policies on the price and availability of telecommunications services. In 2009, we released our tenth annual *Performance Report Scorecard*, an expert evaluation of the quality of annual performance reports produced under the Government Performance and

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[2] Recovery Act, Sec. 6001.

[3] Federal Communications Commission, IN THE MATTER OF A NATIONAL BROADBAND PLAN FOR OUR FUTURE, NOTICE OF INQUIRY (April 8, 2009), paras. 35–51. [Hereinafter "NOTICE OF INQUIRY."]

Results Act by the 24 federal agencies covered by the Chief Financial Officers' Act.[4] We submitted a series of comments proposing outcome-based performance measures for the FCC's universal service programs.[5] We have also conducted extensive analysis of the effects of universal service and intercarrier compensation regulations on price, availability, and consumer welfare.[6] Finally, Mercatus Center scholars have analyzed and testified before Congress on accountability for results under the Recovery Act.[7] Broadband may be new, but the type of analysis required to craft a national broadband plan is not.

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[4] Maurice McTigue, Henry Wray, and Jerry Ellig, *Performance Report Scorecard: Which Federal Agencies Best Inform the Public?* (Arlington, VA: Mercatus Center at George Mason University, 2009), available at www.mercatus.org/scorecard.

[5] Maurice McTigue and Jerry Ellig, *Public Interest Comment on Performance Measures for Universal Service Programs*, FCC Docket 05-195 (Oct. 17, 2005), available at http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518169986; Maurice McTigue and Jerry Ellig, *Notice of Ex Parte Communication*, FCC Docket 05-195 (January 26, 2006), available at http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518313841; Maurice McTigue and Jerry Ellig, *Public Interest Reply Comment on* Comprehensive Review of the Universal Service Fund Management and Oversight, FCC Docket No. 05-195 (Dec. 15, 2008), available at http://www.mercatus.org/PublicationDetails.aspx?id=25580.

[6] Jerry Ellig, *Public Interest Comment on Intercarrier Compensation and Universal Service*, WC Docket No. 05-337 *et. al.,* (Nov. 26, 2008), available at http://www.mercatus.org/uploadedFiles/Mercatus/Publications/PDF_PIC_2008%2011%20Intercarrier%20and%20Universal%20Service%20reform%20Comment%20-%20Ellig.pdf; Jerry Ellig, *Public Interest Ex Parte Comment on Intercarrier Compensation and Universal Service*, CC Docket No. 01-92 et. al, available at http://www.mercatus.org/uploadedFiles/Mercatus/Publications/PICPDF_Intercarrier%20ExParte%20Comment_Ellig.pdf; Andrew Perraut and Jerry Ellig, *Public Interest Comment on High Cost Universal Service* Support, WC Docket No. 05-337 et. al. (March 27, 2008), available at http://www.mercatus.org/uploadedFiles/Mercatus/Publications/High%20Cost%20Universal%20Service%20Support.pdf; Andrew Perraut and Jerry Ellig, *Notice of Ex Parte Communication, Universal Service Contribution Methodology*, WC Docket 06-122 (Nov. 2, 2007), available at http://www.mercatus.org/uploadedFiles/Mercatus/Publications/20071105_USF_Ex_Parte_Oct_2007.pdf; Jerry Ellig, *Public Interest Comment on Unified Intercarrier Compensation*, May 23, 2005, http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6517623936; Jerry Ellig, *Intercarrier Compensation and Consumer Welfare*, 2005 U. of IL. J. OF LAW, TECH., AND POL'Y 97 (2005), available at http://www.mercatus.org/PublicationDetails.aspx?id=17794; Jerry Ellig & Joseph Rotondi, *Outcomes and Alternatives for Universal Telecommunications Services: A Case Study of Texas*, 12 TEXAS REVIEW OF LAW & POLITICS 1 (2007), available at http://www.mercatus.org/PublicationDetails.aspx?id=16094.

[7] Christina Forsberg and Stephanie Haeffele-Balch, "Accountability and Transparency in the American Recovery and Reinvestment Act," *Mercatus on Policy* No. 38 (March 2009), available at http://www.mercatus.org/PublicationDetails.aspx?id=26482; Jerry Ellig, "Recovery Act Oversight," Testimony before the U.S. House Committee on Science and Technology, Subcommittee on Investigations and Oversight (May 5, 2009), available at http://www.mercatus.org/PublicationDetails.aspx?id=27144; Jerry Brito, "Crowdsourcing Accountability: How to Prevent Stimulus Waste and Fraud," Testimony before the U.S. House Committee on Oversight and Government Reform (March 19, 2009), available at http://www.mercatus.org/PublicationDetails.aspx?id=26486; Eileen Norcross, "Following the Money: Accountability and transparency in Recovery Act Science Funding" (March 19, 2009), Testimony Before the House Committee on Science and Technology, available at http://www.mercatus.org/PublicationDetails.aspx?id=26468.

Language in several parts of the Recovery Act and the Notice of Inquiry indicates that the national broadband plan must define desired outcomes, develop measures, compare the likely outcomes and costs of alternative strategies, and establish a process for ex-post evaluation of actual outcomes and costs. Our comments focus on these four aspects. More specifically, the following steps would enable the commission to craft a plan that promotes consumer welfare and identifies the most efficient and effective ways to accomplish broadband policy goals:

- **Define "broadband" as the minimal high-speed service that has garnered substantial subscribership.** This definition allows actual consumer choices to define broadband, instead of substituting government decision makers' judgment about what counts as broadband for consumers' actual decisions about what counts as broadband. It also focuses policy on getting consumers "over the hump" from dialup or no Internet access to entry-level high-speed service that will allow them to experience some of broadband's benefits. The definition can evolve as consumers abandon slower entry-level offerings for higher speeds.

- **Measure broadband access by evaluating whether broadband service is available from wireline, fixed wireless, mobile wireless, or satellite providers in each census tract.** Especially for mobile wireless and satellite providers, the FCC should measure access based on whether the signal is available in the census tract, even if no one in the census tract subscribes to that service.

- **Measure "affordable" broadband prices by reference to prices paid by middle-class consumers in competitive urban and suburban markets.** "Affordable" prices in high-cost areas would be within a designated percentage of prices in urban and suburban areas, perhaps adjusted for income. "Affordable" prices for low-income households would ensure that these households spend no more than a designated percentage of their income on broadband. Progress could be measured by counting the percentage of rural and low-income consumers who have access to broadband at affordable prices.

- **Measure broadband subscribership using the census-tract data that broadband providers are now required to provide.**

- **Establish baselines grounded in reality**. Recognize that broadband availability and subscribership will likely continue to increase even in the absence of new federal policies to encourage broadband.

- **Evaluate benefits and costs of alternative policies.** Explicit evaluation of multiple policy options is necessary to comply with the Recovery Act's requirements that the national broadband plan must promote consumer welfare and identify the most "efficient and effective" mechanisms to promote broadband access.

- **Consider alternatives to infrastructure or subscribership subsidies.** Evaluate whether targeted interventions, such as providing computers to low-income

households, would be more effective than subsidies to broadband providers or consumers.

- **Encourage facilities-based competition.** Continue current policies that avoid forcing broadband providers to share their lines with competitors. Find ways to make more spectrum available for commercial wireless broadband service.

- **Conduct retrospective analysis of outcomes and costs.** Arrange for independent researchers to conduct retrospective analysis to identify whether new broadband programs or policies achieve their intended outcomes and estimate the size of the effects.

II. Define desired outcomes

Outcomes are the actual benefits created, or harms avoided, for citizens. "*Outcomes are not what the program did but the consequences of what the program did*."[8] Outcome measurement is crucial if congressional and FCC decisions are to be based on actual evidence of the effects of alternative broadband strategies. An evidence-based approach requires objective analysis to determine whether, and to what extent, alternative approaches actually cause the intended outcomes—the results that citizens value and that (presumably) motivated Congress to mandate that the FCC produce a national broadband plan.

A. Defining ultimate and intermediate outcomes

The Recovery Act includes an open-ended list of ultimate outcomes that widespread adoption of broadband is supposed to promote: "consumer welfare, civic participation, public safety and homeland security, community development, health care delivery, energy independence and efficiency, education, worker training, private sector investment, entrepreneurial activity, job creation and economic growth, and other national purposes."[9]

The legislation also indicates several intermediate outcomes that contribute to these ultimate outcomes. Most prominently, the first listed goal of the national broadband plan is "to ensure that all people of the United States have access to broadband capability . . ."[10] The act then mandates that the plan must include "a detailed strategy for achieving affordability of such service and maximum utilization of broadband infrastructure and service by the public . . ."[11] This requirement could be interpreted as a directive to ensure that lack of affordability does not preclude anyone from having

[8] Harry P. Hatry, Urban Institute, PERFORMANCE MANAGEMENT: GETTING RESULTS (1999) at 15.

[9] Recovery Act, Sec. 6001(k)(2)(d).

[10] Id. Sec. 6001(k)(2).

[11] Id. Sec. 6001(k)(2)(b).

broadband access.[12] Alternatively, it might be interpreted as a directive for the FCC and other agencies to go beyond ensuring that everyone has access to broadband if they want it and take positive steps to promote subscribership.[13]

Thus, the legislation envisions that the plan will address three intermediate outcomes—access, affordability, and subscribership—as well as a variety of ultimate outcomes.

B. Defining broadband

The Notice of Inquiry begins by raising variants of one critical question for analyzing outcomes: What should count as broadband?[14] One cannot measure access, affordability, subscribership to, or results of broadband without knowing what counts as broadband. Different technologies differ in their maximum download and upload speeds, quality of service, and ability to access or use some content and applications. Broadband technologies and Internet applications have evolved and continue to evolve rapidly and unpredictably. As the commission rightly notes, "it is important that we do not lose sight of the potential for monumental shifts in technological platforms that would render definitions obsolete or indeed harmful to developments that might otherwise take place in the market."[15]

Equally importantly, different broadband users have different needs, desires, and values. The grand and eloquent language in the Notice of Inquiry's introduction sometimes seems to project a world in which everyone uses extremely high-speed broadband for the same diverse set of purposes that will revolutionize all of our lives in the same ways. The reality will likely be quite different. Even *within* customer groups that can be defined by observable criteria such as location, income, race, or age, we are likely to see significant diversity. Some households want to upload and download video or thousands of photos. Some want high-quality interactive gaming. Others couldn't care less about these bandwidth-intensive applications. Some business users want fast and ubiquitous service on their handheld mobile devices. Some find mobile broadband useless unless they have a good mobile broadband card that lets them travel with the full functionality of a notebook computer. Still others find a wireless phone sufficient, delighted that their e-mails cannot follow them everywhere, yapping at their heels for immediate attention.

The Recovery Act obligates the FCC to formulate a broadband policy that promotes consumer welfare.[16] Promoting consumer welfare requires that the FCC take into account the full diversity of consumer needs, desires, and values. Outcome definitions, measures, goals, and policies must accommodate the reality that different consumers want different

[12] The Notice of Inquiry asks about this at para. 27.

[13] Notice of Inquiry, paras. 55–57.

[14] Id. at paras. 15–22, 23–24, 26.

[15] Id. at para. 22.

[16] Recovery Act, Sec. 6001(k)(2)(d).

things. For this reason, we caution the commission to avoid adopting definitions, measures, goals, and policies that give undue privilege to the values and aspirations of sophisticated, high-intensity broadband users. Even without intending to do so, the commission may find itself drawn in that direction simply because these kinds of sophisticated users are likely over-represented among the professionals most likely to get involved in this proceeding, such as business advocates, technologists, public-interest groups, the educational community, bloggers, and perhaps even government employees who make technology policy.

It is not enough that the national broadband plan define broadband in a technology-neutral way. It must also define broadband in a *value-neutral* way, so that goals, measures, and policies do not assume that all consumers want the same speeds, functionality, or applications.

The FCC has made a good start with its March 2008 Report and Order on broadband data. The new Form 477 requires broadband providers to report for each census tract the number of subscribers in various upload and download speed categories. One can also see the total number of subscribers receiving any type of high-speed service.[17] A subsequent revision required broadband providers to report the percentage of residential subscribers for each census tract and speed tier.[18] The FCC should continue to measure progress and assess the effects of public policy for all of the speed categories. If other aspects of performance are deemed critical, then data should be collected and reported on that dimension as well.

To the maximum extent possible, policies should be designed so that consumer choice determines the particular speeds, technologies, and capabilities of their broadband service. When the FCC defines "broadband" for the purpose of establishing goals and targets, it should look to consumer behavior as a guide. "Broadband" should be defined as the minimal high-speed service that has gained substantial consumer acceptance in the marketplace. As consumers migrate to higher speeds and abandon slower, "entry level" offerings, the minimum level of service that qualifies as broadband could change in the future. This approach would promote consumer welfare by allowing the FCC to establish measures and plans without imposing on consumers its own views of what broadband services or capabilities they "should" need or want.

III. Develop measures and targets

The Recovery Act requires the national broadband plan to establish benchmarks for assessing progress toward the goal of universal broadband access.[19] Benchmarks, of

[17] Federal Communications Commission, IN THE MATTER OF DEVELOPMENT OF NATIONWIDE BROADBAND DATA, REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING (March 19, 2008), paras. 20–21. [Hereinafter "BROADBAND DATA REPORT AND ORDER."]

[18] Federal Communications Commission, IN THE MATTER OF DEVELOPMENT OF NATIONWIDE BROADBAND DATA, ORDER ON RECONSIDERATION (June 11, 2008).

[19] Recovery Act, Sec. 6001(k)(2).

course, imply measurement. The Notice of Inquiry notes that OMB guidance requires agencies to "include measures of quantifiable outcomes supported by corresponding quantifiable output measures" in Recovery Act program plans.[20] The notice explicitly acknowledges the importance of establishing a relevant baseline to evaluate program performance: "We also seek comment on how progress can be measured relative to progress that would have occurred in the absence of any program to better understand the impact of the program."[21]

A. Access

1. Measurement

The most straightforward definition of "access" is whether the service is available for households and businesses to subscribe if they choose. The commission could measure progress on availability by producing a series of tables similar to tables 18 and 19 in the January 2009 FCC report on High-Speed Services for Internet Access.[22] Table 18 shows the percentage of the U.S. population that resides in zip codes with high-speed service. Zip codes are broken down by deciles, so progress in the most sparsely populated zip codes can be compared with progress in the more populous ones. Similarly, table 19 shows the percentage of the population living in zip codes with high-speed service, grouped by ranges of median household income. This facilitates measurement of progress in low-income areas. The commission could use the same basic approach to assess availability of service using the more granular subscribership data that companies must now report on a census-tract basis rather than a zip-code basis. Since the commission gathers broadband data on a variety of upload and download speed ranges, it should not be difficult to produce a set of tables that shows the availability of broadband services of various speeds, broken down based on population density and median household income.

Several changes from current practice would make the availability measurement more accurate. For the most part, the FCC's high-speed services reports use the presence of a single subscriber in a zip code as a proxy measurement for whether the service is available in that zip code. As the commission recognizes, this practice may overstate availability of service because the service may not be available in the entire zip code. Collection of data at the census-tract level will help remove this bias.[23]

However, this change will not correct for other biases that might lead the subscribership data to understate the availability of service. Service could be available in a census tract even if no one in that particular census tract chooses to subscribe. This possibility could be especially significant for mobile wireless and satellite broadband, since their signals

[20] NOTICE OF INQUIRY, para. 34.

[21] Id.

[22] Federal Communications Commission, HIGH-SPEED SERVICES FOR INTERNET ACCESS: STATUS AS OF DECEMBER 31, 2007 (January 2009), Tables 18 and 19. [Hereinafter "HIGH-SPEED SERVICES REPORT."]

[23] BROADBAND DATA REPORT AND ORDER at paras. 9–12.

may be "broadcast" into census tracts where they do not have any subscribers. For this reason, a more reliable assessment of availability would count every census tract in a provider's service footprint as a census tract with service. Terrestrial mobile wireless providers now report this data.[24] The commission should consider whether it should require similar reporting from satellite broadband providers, or whether the nature of satellite service effectively means that all speeds of satellite broadband are available in all census tracts. Finally, the commission should consider whether wireline and fixed wireless broadband providers have service available in an appreciable number of census tracts where they currently have no subscribers. If so, then it may be appropriate to require them to report what services they have available in each census tract, rather than just requiring them to report on subscribership by census tract.

The zip-code-based data in the commission's most recent high-speed report suggest that availability of service is a problem confined to the least populous locations in the nation. In December 2007, more than 99 percent of the population in four-fifths of the nation's zip codes had access to broadband. Even in the least-populated zip codes, 96.9 percent of the population had access.[25] When the data are segmented by household income, more than 99 percent of the people in even the poorest zip codes appear to have broadband available. In the poorest 10 percent of zip codes, with median household incomes below $21,645, 99.5 percent of the population had broadband available, compared to 99.9 percent in some of the wealthier groups of zip codes.[26]

The more granular data collected by census tract and speed category may or may not show similar results. If the commission must proceed with a plan before more granular data can be collected and analyzed, the only conclusion supported by currently available evidence is that broadband availability is a problem for just a very small portion of the population living in the most remote and/or poorest areas of the nation. A more prudent approach would be to await the availability of the better data the commission has already required firms to furnish before developing plans and strategies to improve broadband availability.

2. Baselines

Broadband has gained consumer acceptance and evolved rapidly. There is no reason to think that it will not continue to do so. Consequently, any strategy to improve broadband availability must first consider the baseline—how availability can be expected to improve in the absence of any further policy changes. New policies can be justified only if decision makers judge that the baseline level of improvement is not rapid enough, and cost-effective policies can be designed to increase the rate of improvement.

[24] BROADBAND DATA REPORT AND ORDER at para. 16.

[25] HIGH-SPEED SERVICES REPORT, table 18.

[26] Id. at table 19.

A glance at trends in high-speed service subscribership data from table 18 in the FCC's most recent high-speed services report illustrates why an accurate baseline is crucial for effective strategic planning. Even in the least-populated parts of the country, experience shows that we can expect to see some improvement in availability over time. The 2007 zip-code data suggest that 96.9 percent of the population in the least-populated 10 percent of zip codes had broadband available. While this figure lags the leaders, it reveals tremendous improvement since 2001 and even 2004. It is worth noting that the two groups of zip codes with just slightly higher population densities—6–15 and 15–25 people per square mile—had availability below 96 percent in 2003. By 2007, both groups had achieved roughly 99 percent availability.

High speed availability ranked by population density (year-end)

Persons per square mile							
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
More than 3147	99.8	100	100	100	99.9	99.9	99.9
947–3147	99.7	100	99.9	99.9	99.9	99.9	99.9
268–947	99.5	99.9	100	100	100	100	100
118–268	99.1	99.7	99.8	99.8	99.8	99.8	99.9
67–118	97.1	99.1	99.7	99.7	99.8	99.8	99.7
41–67	94.4	97.8	99.0	99.3	99.5	99.5	99.6
25–41	87.6	95.6	97.7	98.5	99.3	99.5	99.4
15–25	80.4	90.8	95.7	96.8	98.9	99.1	99.2
6–15	76.2	86.4	93.2	95.0	98.4	98.7	98.8
Fewer than 6	67.9	80.9	88.9	91.8	96.2	96.8	96.9

Source: FCC HIGH-SPEED SERVICES REPORT, table 18.

These figures do not mean that the least-populated decile of zip codes will achieve 99 percent availability in the absence of new policies. But the figures do suggest that substantial improvement will occur within a few years, even without changes in federal policy. This further supports the conclusion that, based on currently available data, any broadband-availability problem is likely quite limited in scope.

Of course, these figures based on zip-0code data may not accurately measure broadband availability; we present them here solely as an example of why the baseline will likely include improvements in availability above the level reflected in the most recent data. This general insight will be true for broadband data gathered at any level of granularity, be it the census tract or the individual home or business. Therefore, it would be a mistake to conclude that the first batch of census-tract data defines the baseline upon which the National Broadband Plan will build. An accurate baseline should project growth in broadband availability.

3. Goals and targets

We suggested earlier that to establish goals and targets for policy, the FCC should define broadband as the minimum-speed service offering that has gained widespread consumer

acceptance. As of December 2007, the most recent data available, 40.9 million out of 101 million total high-speed lines exceed 200 kilobytes per second (kbps) in only one direction. Another 34.9 million lines exceed 200 kbps in both directions and have speeds of between 200 kbps and 2.5 megabytes per second (mbps) in one direction.[27] These data are not very helpful in crafting a consumer-centered definition of broadband, because it is not clear how fast most of the 40.9 million lines exceeding 200 kbps in one direction really are. The FCC's new data, grouped into more narrowly defined speed categories, should help solve this problem. Perhaps the data will show that millions of customers still use high-speed lines only slightly faster than 200 kbps in one direction. Or perhaps the minimum speed chosen by a substantial number of customers is now higher—maybe the 768 mbps offered by entry-level DSL plans.

B. Affordability

1. Measures

The Recovery Act's call for affordability is an expression of congressional concern that price may prevent an appreciable number of customers from subscribing. In this context, an "affordable" price for people in high-cost areas or low-income consumers would be a price that would give these customers the same opportunity to subscribe that urban, suburban, and middle-income Americans have.

A logical measure of affordability for high-cost areas would be the ratio of rural to urban broadband prices, perhaps adjusted for median household income. A logical measure for affordability for low-income households would be the price of broadband as a percentage of household income for low-income versus middle-income households. These are similar to the affordability measures one author of this comment has recommended in the past for the FCC's high-cost and low-income programs for telephone service.[28]

Such measures are, of course, only benchmarks that could be used to track progress. By suggesting measures similar to those we have suggested for universal telephone service programs, we are not suggesting that policymakers should employ the same means they have employed in their attempts to make local telephone service affordable. Extensive economic research finds that overall consumer welfare is significantly lower as a result of policies that regulate local telephone rates to keep them well below cost and then subsidize particular providers with revenues gleaned from assessments on services whose demand is price sensitive.[29] Consistent with the language of the Recovery Act, the FCC should select the most effective and efficient means after analyzing alternative policies.

[27] HIGH-SPEED SERVICES REPORT (2007), tables 1 and 5.

[28] See comments by McTigue and Ellig, *supra* note 5.

[29] See research cited in comments and articles listed in note 6 *supra*.

2. Baselines

As with availability, affordability requires calculation of a baseline to determine if any policy change is warranted. The baseline should reflect expected changes in broadband prices for rural and urban areas.

Past evidence shows that broadband prices have fallen as competition has increased and competitors with less market share have gained economies of scale. Between 2004 and 2005, Bellsouth cut the monthly price of 1.5 mb DSL from $39.95 to $32.95, a 17 percent drop. Qwest dropped its promotional price from $26.99 to $19.99 and extended the term from three months to a year. SBC cut its promotional price, good for a year, from $26.95 to $14.95.[30] Verizon Wireless reduced the monthly fee for wireless broadband service using a PC card by 25 percent, from $79.99 to $59.99.[31] Survey data from the Pew Internet and American Life Project suggest that the average price of broadband fell by 4 percent between December 2005 and April 2008. Similarly, Pew surveys revealed an 8 percent price drop between February 2004 and December 2005.[32]

Since maximum broadband speeds continue to increase, the price per megabyte has likely fallen even faster than the Pew figures suggest. In its first report on the extent of broadband deployment, the FCC noted that the maximum speeds were 3 mbps for cable modem service, 1.5 mbps for DSL, and under 500 kbps for satellite.[33] Speeds have obviously improved greatly since then. The FCC's latest high-speed services report indicates that 38 percent of DSL lines (11 million) have speeds between 2.5 and 10 mbps, and the vast majority of cable modem lines (28 million) have speeds in the same range.[34] Satellite Internet offers download speeds of up to 5 mbps, with entry-level service offerings of 1 mbps.[35]

3. Goals and targets

If affordability in high-cost areas is measured by the ratio of rural to urban prices, then a logical goal would be for policy to affect this ratio by some specified amount that presumably reflects the difference between the desired ratio and the baseline. Similarly, a

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[30] Michael J. Balhoff and Robert C. Rowe, MUNICIPAL BROADBAND: DIGGING BENEATH THE SURFACE (2005) at 23.

[31] http://www.verizonwireless.com/b2c/mobileoptions/broadband/index.jsp?action=broadbandAccess.

[32] John B. Horrigan, Pew Internet & American Life Project Survey, ADOPTION STALLS FOR LOW-INCOME AMERICANS EVEN AS MANY BROADBAND USERS OPT FOR PREMIUM SERVICES THAT GIVE THEM MORE SPEED, (July 2008) at 8, available at http://www.pewinternet.org/~/media/Files/Reports/2008/PIP_Broadband_2008.pdf.

[33] FCC, BROADBAND REPORT 1999, CC Docket No. 98–146 (January 28, 1999).

[34] HIGH-SPEED SERVICES REPORT, table 5.

[35] See www.hughesnet.com, www.starband.com, and www.wildblue.com.

logical affordability target for low-income households would be a specified change in the price/income ratio compared to the baseline.

C. Subscribership

1. Measurement

Developing measures of subscribership is perhaps an easier task, since the FCC already gathers subscribership data from broadband providers and recently required providers to submit subscribership data on the census-tract level.

Since providers will report subscribership at various combinations of upload and download speeds by census tract, it should be possible to sort census tracts by population density and median household income to produce tables similar to tables 18 and 19 in the FCC's high-speed services report for December 2007. These tables could report the percentage of the population (and perhaps the percentage of business establishments) actually subscribing to broadband in census tracts with various ranges of population densities and median household incomes.

Due to wi-fi and mobile wireless, it is possible that some customers could subscribe to more than one broadband service. Subscription rates might exceed 100 percent in some census tracts, even if not everyone in the census tract subscribes. Nevertheless, calculating subscribership in locations with different population densities and income levels should produce useful information. There is no obvious reason why the locations or populations with the lowest subscription rates (below 100 percent) would not still be the ones potentially in greatest need of assistance.

2. Baselines

The same caveats we offered in our discussion of baselines for broadband availability apply also to broadband subscribership. Subscribership can surely be expected to grow in the future even if the federal government does nothing else to encourage it. Whether one measures high-speed lines, advanced-services lines, or just residential lines of either type, tables 1–4 in the FCC's most recent high-speed services report show dramatic growth rates. Between 2005 and 2007, the number of high-speed lines more than doubled. The number of advanced services lines grew by 80 percent, and residential broadband subscriptions grew by 70 percent under either definition in just two years.[36] Survey data from the Pew Internet and American Life Project reveal that adoption rates by the poorest Americans increased from 10 percent in 2005 to reach 25 percent in 2008. Increases in broadband subscribership have been strong among lower- and middle-income Americans as well as rural consumers. Sixty percent of suburban consumers, 38 percent of rural consumers, and 57 percent of urban consumers now have broadband at home.[37]

[36] Calculations based on data in HIGH-SPEED SERVICES REPORT, tables 1–4.

[37] Horrigan, supra note 32, at 3.

One can combine baseline estimates of price changes with information about the elasticity of demand for broadband to estimate price-driven baseline changes in subscribership. The elasticity of demand measures customer responsiveness to price changes; it indicates the percentage change in quantity that occurs in response to a 1 percent change in price. Multiple studies find that the elasticity of demand for DSL broadband service exceeds -1; that is, a 1 percent change in price leads to a greater than 1 percent change in subscribership.[38] Most attempts to measure the overall elasticity of demand for broadband—not just DSL—have found that it is highly elastic (very responsive to price changes) ranging from -1.5 to -3.76.[39] One of the most recent papers, by University of Chicago economist and Council of Economic Advisers member Austan Goolsbee, found an average demand elasticity of -2.75.[40] The Pew survey data suggest that broadband prices fell by about 12 percent between February 2004 and April 2008.[41] If that trend were to continue for the next four years, a demand elasticity of -2 suggests that broadband subscribership would increase by 24 percent. With 121 million subscribers to high-speed service in December 2007, that works out to 29 million additional subscribers over the next four years, driven solely by baseline changes in broadband prices. We offer this back-of-the-envelope estimate not as a forecast, but simply to illustrate that large increases in subscribership could well occur even in the absence of further policy changes.

The baseline should reflect continued growth, both because of continually expanded deployment and because of higher penetration rates in places that already have broadband. Prospective policies should be evaluated based on their likely contribution to subscription growth over and above the baseline.

3. Goals and targets

As we recommended in regard to availability, the FCC should define broadband for subscription measurement as the minimum speed that a significant number of consumers have chosen to buy. Such a definition would focus policy on getting consumers over the initial hump from dialup, or no Internet access at all, to an entry-level high-speed service that allows them to experience at least some of the benefits of broadband.

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[38] Robert W. Crandall, J. Gregory Sidak, and Hal J. Singer, *The Empirical Case Against Asymmetric Regulation of Broadband Internet Access*, 17 BERKELEY TECHNOLOGY LAW JOURNAL (Summer 2002) at 973-74; Robert W. Crandall, Robert W. Hahn, and Timothy J. Tardiff, *The Benefits of Broadband and the Effect of Regulation*, in Robert W. Crandall and James H. Alleman (eds.), BROADBAND (2002) at 301 and references cited therein.

[39] Austan Goolsbee, *Subsidies, the Value of Broadband, and the Importance of Fixed Costs*, in Crandall and Alleman, Id. at 283–84.

[40] Austan Goolsbee, The Value of Broadband and the Deadweight Loss of Taxing New Technology, NBER Working Paper No. 1194 (2006) at 11.

[41] Horrigan, *supra* note 32.

IV. Compare likely outcomes and costs of alternatives

Effective strategic planning requires evaluation of the results of alternative courses of action. The Recovery Act says that the national broadband plan must include "an analysis of the most effective and efficient mechanisms for ensuring broadband access by all people . . ."[42] One cannot identify "the most efficient and effective mechanisms" without comparing alternatives. The Notice of Inquiry seeks comment on a wide variety of alternative strategies for promoting broadband access and use, including market mechanisms, spectrum policy, tax incentives, universal service subsidies, open network regulations, competition, digital literacy programs, and privacy policy.[43]

To satisfy the requirements of the Recovery Act, the national broadband plan must evaluate both the expected outcomes and the expected costs of alternatives. Two pieces of legislative language compel this result.

First, the plan must identify the most "effective and efficient" mechanisms. Identifying the most-effective approach requires one to project the types and amounts of outcomes each alternative is expected to produce. Identifying the most-efficient approach requires one to compare outcomes (benefits) with costs to determine which strategy or strategies produce the greatest net benefits.

Second, the Recovery Act includes "consumer welfare" as one of the ultimate outcomes the broadband plan is supposed to promote.[44] "Consumer welfare" is a well-defined term in economic and legal literature.[45] In theory, consumer welfare is measured by the difference between the prices consumers pay for goods and services and what those goods and services are actually worth to the consumers. Consumer welfare is intimately linked with economic efficiency. Economic efficiency occurs when every unit of every resource in the economy is employed in the use that consumers value most highly. Consumer welfare is maximized when economic efficiency is maximized, and competition or regulation ensures that the maximum possible efficiency benefits are passed through to consumers. Thus, in order to understand how a policy option affects consumer welfare, the FCC must understand how the policy affects economic efficiency and the distribution of efficiency benefits between producers and consumers. This means the FCC must compare benefits with costs and assess the incidence of costs and benefits.

[42] Recovery Act, Sec. 6001(k)(2)(a).

[43] NOTICE OF INQUIRY, paras. 37–52.

[44] Recovery Act, Sec. 6001(k)(2)(d).

[45] See, e.g., W. Kip Viscusi, Joseph E. Harrington, Jr., and John M. Vernon, ECONOMICS OF REGULATION AND ANTITRUST, 4th Ed. (2005) at 79–84; Dennis W. Carleton and Jeffrey M. Perloff, MODERN INDUSTRIAL ORGANIZATION, 2D. ED. (1994) at 102–107. Some scholars equate maximum economic efficiency with maximum consumer welfare, even if market power allows business firms to appropriate some of the efficiency gains, on the grounds that business owners are ultimately also consumers. See Robert H. Bork, THE ANTITRUST PARADOX (1978) at 110–111.

Most of the studies of which we are aware assess policies that affect broadband subscribership. Below, we summarize some of the research findings most-directly relevant to the benefits or costs of broadband policies.

A. Policies affecting subscribership

1. Subsidies

The ultimate goal of broadband subsidies is to increase subscribership by reducing the price paid by customers. The government could give purchasing power directly to consumers, provide direct capital subsidies to providers, provide ongoing payments to providers, or provide indirect support via tax incentives to providers.

In theory, subsidies could generate large increases in subscribership, since broadband demand appears to be quite responsive to price changes.[46] In practice, subsidies may not be the most cost-effective way to increase subscribership, since it is often difficult to target subsidies only to those consumers who would not otherwise have subscribed. This is a problem well-known among scholars who study universal telecommunications service programs. It is even a problem for the low-income universal service programs, which are arguably more targeted than the high-cost programs.[47]

It is not clear how much of a subsidy would be required to increase broadband penetration noticeably. According to the Pew Internet and American Life Project, 7 percent of all non-Internet users in December 2007 said broadband is too expensive, and 35 percent of dialup users in May 2008 said the price would have to fall to induce them to switch from dialup to broadband at home. Together, these groups account for 5 percent of American adults.[48] Regarding availability, 13 percent of non-Internet users and 14 percent of dialup users say they lack access to broadband; together, these account for another 4.5 percent of U.S. adults. Subsidies might induce some unknown portion of this 4.5 percent to subscribe, if subsidies are necessary to make broadband available where they live.

Some of the other Pew survey data raise the question of whether subsidies would be the most cost-effective way to improve subscribership. For example, 16.4 percent of American adults said they do not have broadband for reasons Pew grouped under the heading of "relevance," such as lack of interest in getting online, too busy to get online, or "nothing would get me to switch" from dialup to broadband.[49] The most obvious

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[46] See Section III.B.2 *supra*.

[47] Christopher Garbacz & Herbert G. Thompson, *Estimating Demand with State Decennial Census Data from 1970–1990*, 21 J. REG. ECON. 317 (2002) at 328.

[48] John B. Horrigan, "Stimulating Broadband Investment: If Obama Builds It, Will They Log On?" (January 21, 2009) at 2, available at http://www.pewinternet.org/~/media//Files/Reports/2009/PIP_Broadband%20Barriers.pdf.

[49] Id.

differences in broadband penetration rates are not based on age (although the number of users drops dramatically amongst consumers 65 and older), gender, or ethnicity, but rather differences between the lowest and highest educational attainment and income levels.[50] Similarly, a November 2007 study performed by the Phoenix Center indicated that 91 percent of the variation in broadband adoption rates is explained by economic and demographic conditions such as education and household income.[51] Given that education and income tend to be correlated with each other, the biggest barriers to broadband adoption that could be addressed cost-effectively may be relevance, consumer awareness, and perceived value rather than price.

Empirical studies of subsidy programs suggest that subsidies are a very expensive way to promote broadband access, if they have an effect at all. A 2007 study by David Gabel concluded that the FCC's high-cost support payments to large incumbent telephone companies do not affect the provision of DSL-capable lines in rural areas, but subsidies to small rural phone companies do increase their proportion of DSL-capable lines. He attributes this difference to the fact that the FCC does not hold large incumbents accountable for using universal service funds (USF) to provide high-speed services in rural areas, plus the fact that rural phone companies are eligible for more USF support and other types of subsidies the large incumbents cannot receive, such as low-cost loans from the Rural Utility Service.[52]

A June 2005 empirical study by Scott Wallsten found that state universal service funds and expenditures by the USDA's Rural Development broadband program had no effect on broadband availability in states, but the broader USDA Rural Development telecommunications program did. However, the USDA telecommunications program appears to be a very costly way of increasing access, with a cost of $1,500 per person who gains access.[53]

For these reasons, the commission should assess whether other means of increasing subscribership would be more cost-effective than subsidies.

2. Targeted interventions

Current research seems to indicate that the problem with broadband deployment and subscription is largely demand side. Surely for the 30 million American adults with "below basic" literacy skills,[54] availability and cost of broadband are not the principal

[50] Horrigan, *supra* note 32, at 3.

[51] George Ford, Thomas Koutsky, and Lawrence Spiwak, "The Demographic and Economic Drivers of Broadband Adoption in the United States" (November 2007), available at http://www.phoenix-center.org/pcpp/PCPP31Final.pdf.

[52] David Gabel, *Broadband and Universal Service,* 31 TELECOM POL'Y 327 (2007).

[53] Scott Wallsten, "Towards Effective U.S. Broadband Policies," (May 2007) at 14, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=986703.

[54] National Center for Education Statistics, National Assessment of Adult Literacy, available at http://nces.ed.gov/naal/kf_demographics.asp.

obstacles to subscribership. Focus on factors such as low income and education levels with targeted broadband efforts may be the most cost-effective remedy.

For example, policies like ConnectKentucky's "No Child Left Offline" may be far more cost-effective in encouraging broadband adoption than subsidies for construction of networks.[55] No Child Left Offline combines public and private efforts to provide computers to "economically disadvantaged" children. One of the greatest barriers to broadband subscribership in Kentucky was "no computer at home" (representing 51 percent of nonsubscribers). The No Child Left Offline policy enabled low-income families to obtain a household computer, increasing computer ownership by four to five times in the counties served by this policy, which in turn led to a 200 percent increase in broadband adoption by low-income families.[56]

3. Unbundling

Numerous studies of unbundling or open-access policies, which force telephone providers to lease their lines to competitors at a discount, find that these policies actually suppress broadband subscribership by inhibiting deployment.

A February 2008 study by Thomas Hazlett and Anil Caliskan examined the effects of three U.S. legal regimes governing DSL and cable in recent years, which provide "natural experiments" to assess the effects of different policies.[57] When DSL was subject to unbundling mandates, investment incentives were retarded while cable broadband service enjoyed a "two-to-one" market share advantage. When the FCC eliminated line-sharing rules, DSL subscribership increased substantially relative to cable subscriber growth—even though the change meant that competing DSL providers had to pay higher prices to lease incumbent phone companies' lines. When the FCC finally classified DSL as an "information service" and continued deregulation of broadband carriers, subscribership increased. Similarly, Scott Wallsten's 2005 study of the effects of federal and state policies on broadband penetration found that a higher percentage of lines provided as unbundled network elements had a negative correlation with broadband penetration.[58] Empirical evidence strongly cautions against returning to open access or unbundling policies because they inhibited broadband investment and deployment in the United States when they were in effect here.

Other evidence suggests that they reduced investment in other countries as well. A 2003 study of European broadband by DotEcon and Criterion Economics found that there is no

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[55] Ford et. al., *supra* note 51.

[56] David Shideler, Narine Badasyan, Laura Taylor, *The Economic Impact of Broadband Deployment in Kentucky*, 3 REGIONAL ECON. DEV. 88, 89 (2007). See also Connect Nation, Inc., "The Economic Impact of Stimulating Broadband Nationally" (February 2008), at http://www.connectednation.org/_documents/Connected_Nation_EIS_Study_Full_Report_02212008.pdf.

[57] See Thomas W. Hazlett and Anil Caliskan, Natural Experiments in U.S. Broadband Regulation, (February 2008), at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1093393

[58] Wallsten, *supra* note 53, at 13.

correlation between broadband penetration and the market share of non-incumbent DSL providers who use the incumbents' lines.[59] An analysis of broadband penetration in OECD countries by Scott Wallsten found that extensive unbundling mandates tend to reduce broadband penetration, but regulations that merely make interconnection easier increase broadband penetration.[60]

4. Facilities-based competition

"Contrived competition" via unbundling does not increase broadband subscribership, but facilities-based or "platform" competition does. A study of broadband adoption rates across U.S. states in 2000 by Debra Aron and David Burnstein found that facilities-based competition has a big effect on broadband adoption rates. In fact, they found that broadband availability had no effect on adoption rates after controlling for the percentage of the populating living in places where DSL and cable modem competed; facilities-based competition drove the broadband adoption rate.[61]

The 2003 analysis of European broadband by DotEcon and Criterion Economics found that broadband penetration is highest in countries where the market shares of cable modem and DSL are most equal. The authors concluded that this indicates platform competition encourages broadband adoption.[62] In one of the few studies examining availability rather than subscribership, a 2006 analysis of broadband in the European Union found that increased competition between DSL and cable modem leads to a higher proportion of broadband-capable lines—a result the authors interpret as consistent with the DotEcon/Criterion study.[63] A study of OECD countries by Cava-Ferreruela and Alabau-Munoz likewise concluded that platform-based competition has a significant positive effect on the percentage of DSL-capable local loops.[64]

These findings suggest that one of the most effective ways the FCC could spur broadband deployment and subscribership would be to encourage facilities-based competition. One method is to continue current policies that refrain from forcing broadband providers to share their networks with competitors who have not built facilities of their own. Another is to continue to make additional spectrum available for commercial wireless services.

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[59] DotEcon and Criterion Economics, "Competition in Broadband Provision and Its Implications for Regulatory Policy" (October 2003) at 117–18, available at www.ssrn.com.

[60] Scott Wallsten, "Broadband and Unbundling Regulations in OECD Countries," AEI-Brookings Joint Center for Regulatory Studies (2006), available at http://aei-brookings.org/admin/authorpdfs/redirect-safely.php?fname=../pdffiles/phpSV.pdf

[61] Debra J. Aron and David E. Burnstein, "Broadband Adoption in the United States: An Empirical Analysis" (March 2003), available at www.ssrn.com.

[62] DotEcon and Criterion Economics, *supra* note 59, at 113–14.

[63] Walter Distaso, Paolo Lupi, and Fabio M. Manenti, *Platform Competition and Broadband Uptake:Theory and Empirical Evidence from the European Union*, 18 INFO ECON & POL'Y 87 (2006).

[64] Inmaculada Cava-Ferreruela and Antonio Alabau-Munoz, *Broadband Policy Assessment: A Cross-National Empirical Analysis*, 30 TELECOM POL'Y 445 (2006).

The federal government affects the price of wireless telephone and Internet services by determining how much spectrum these services can use. The fact that the commercial wireless companies must now purchase licenses through auctions does not increase the prices consumers pay for wireless services; auctions merely allow the government to collect some of the profit from the firms using the spectrum.[65] But by creating an artificial scarcity of spectrum, a critical input, regulators increase the prices that wireless firms can charge consumers by reducing the supply of wireless services. These price increases and resulting consumer welfare losses would occur regardless of whether the FCC awarded licenses through auctions, hearings, or lotteries.[66]

The explosive growth of wireless service in the 1990s demonstrates how spectrum policy can have large effects on consumer welfare. In the 1980s, the federal government licensed only two cellular providers in each market.[67] In 1993, Congress directed the FCC to auction some additional spectrum for wireless communications services, and the FCC responded by auctioning almost twice as much spectrum as it had already allocated to cell phone service, effectively making room for six wireless providers.[68] Between 1984 and 1995, when there were just two cell phone companies per market, inflation-adjusted rates fell by an average of between 3 and 4 percent annually.[69] Entry of new competitors prompted price reductions averaging 17 percent annually between 1995 and 1999.[70] The value that wireless telephone service has created for consumers is truly staggering. One estimate suggests that consumers valued the first generation of cell phone service at $50 billion per year.[71] Economic studies find that allocating additional spectrum for commercial wireless services would generate enormous increases in consumer welfare. A 2004 study estimated that reallocating up to 200 MHz of spectrum to mobile wireless services—slightly more than double the amount allocated to these services at the time—would generate an increase in consumer welfare of $77.4 billion per year.[72] Empirical studies using international data find countries that treat spectrum more like property have

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[65] See Evan Kwerel, FCC, SPECTRUM AUCTIONS DO NOT RAISE THE PRICE OF WIRELESS SERVICES: THEORY AND EVIDENCE (2000), available at http://wireless.fcc.gov/auctions/data/papersAndStudies/SpectrumAuctionsDoNotRaisePrices.pdf.

[66] In economic terminology, federal spectrum policy shifts the supply curve of wireless services downward (to the left).

[67] Robert W. Crandall & Jerry A. Hausman, *Competition in U.S. Telecommunications Services: Effects of the 1996 Legislation*, *in* DEREGULATION OF NETWORK INDUSTRIES: WHAT'S NEXT? (Sam Peltzman & Clifford Winston eds., 2000), at 102.

[68] *Id.* at 102–03.

[69] *Id.* at 103.

[70] *Id*.

[71] See Jerry A. Hausman, *Valuing the Effect of Regulation on New Services in Telecommunications*, *in* 1997 BROOKINGS PAPERS ON ECONOMIC ACTIVITY. MICROECONOMICS 2 (Martin N. Baily et al. eds., 1998), available at http://econ-www.mit.edu/faculty/download_pdf.php?id=470.

[72] See Thomas W. Hazlett et al., SENDING THE RIGHT SIGNALS: PROMOTING COMPETITION THROUGH TELECOMMUNICATIONS REFORM (Washington, DC: U.S. Chamber of Commerce, 2004) at 69, available at http://www.uschamber.com/NR/rdonlyres/et3cydgjplrxcg7goxb5tlflazo2tw5hghhyplt7cu6wooge3bcnpqzx4bjeqb7ws5xqmgohikgclahnl77gydqmnvb/0410_telecommstudy.pdf.

more spectrum available for wireless service, less market concentration, lower prices, and greater output of wireless services.[73]

V. Evaluate actual outcomes and costs

Section 6001 of the Recovery Act is less explicit about the kinds of provisions for future monitoring the national broadband plan is supposed to include. The act calls for benchmarks for measuring access,[74] and presumably Congress would not have asked the FCC to develop benchmarks if it did not also expect the FCC to report on progress toward those benchmarks in the future. The fact that the plan must include "an evaluation of the status of deployment of broadband service"[75] also suggests that Congress expects the plan to establish a baseline against which future progress can be measured. The Notice of Inquiry explicitly seeks comment on metrics and data the FCC should use to measure progress.[76]

In section III above, we suggested measures the FCC could use to set goals and track progress against baselines. Measuring progress on broadband availability, affordability, and subscribership will help determine how fast the nation is approaching the goals set for these outcomes. Merely observing progress, however, does not indicate how public-policy initiatives have contributed toward that progress.

To understand whether new policies are achieving their goals, the FCC must assess how the policies have contributed to the observed outcomes. The FCC should arrange for independent researchers to conduct retrospective analysis to identify whether new broadband programs or policies achieve their intended outcomes and estimate the size of the effects. The analysis should control for other factors that affect the outcomes so it can identify how much of the effect was caused by the new programs or policies.

VI. Conclusion

The FCC's Notice of Inquiry begins by stating, "High-speed ubiquitous broadband can help to restore America's economic well-being and open the doors of opportunity for more Americans, no matter who they are, where they live, or the particular circumstances of their lives. It is technology that intersects with just about every great challenge facing

[73] See, e.g., Thomas W. Hazlett, Giancarlo Ibárgüen S, and Wayne A. Leighton, *Property Rights to Radio Spectrum in Guatemala and El Salvador: An Experiment in Liberalization*, 3 REV. LAW & ECON. 2 (2007); Thomas W. Hazlett and Robert E. Munoz, *What Really Matters in Spectrum Allocation Design* (AEI-Brookings Joint Center for Regulatory Studies, Working Paper No. 04-16, 2004), available at http://mason.gmu.edu/~thazlett/pubs/What%20really%20matters_hazlett.pdf; Thomas W. Hazlett, *Property Rights and Wireless License Values* 4 (AEI-Brookings Joint Center for Regulatory Studies, Working Paper No. 04-08, 2004), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=519602.

[74] Recovery Act, Sec. 6001(k)(2).

[75] Id. Sec. 6001(k)(2)(c).

[76] NOTICE OF INQUIRY, paras. 29–34.

our nation."[77] Given the high stakes, it is critical that the national broadband plan be an evidence-based initiative rather than a faith-based initiative. Language in the Recovery Act and in the Notice of Inquiry reflects this imperative. An evidence-based national broadband plan must define desired outcomes, develop measures, compare the likely outcomes and costs of alternative strategies, and establish a process for ex-post evaluation of actual outcomes and costs.

We believe the following steps would ensure that the FCC crafts a national broadband plan that is based on real-world evidence and complies with the Recovery Act's requirements to promote consumer welfare and find the most "efficient and effective" ways to promote policy goals:

- Define "broadband" as the minimal high-speed service that has garnered substantial subscribership.

- Measure broadband access by evaluating whether broadband service is available from wireline, fixed wireless, mobile wireless, or satellite providers in each census tract.

- Measure "affordable" broadband prices by reference to prices paid by middle-class consumers in competitive urban and suburban markets.

- Measure broadband subscribership using the census-tract data that broadband providers are now required to provide.

- Establish baselines that recognize broadband availability and subscribership will likely continue to increase even in the absence of new federal policies to encourage broadband.

- Evaluate benefits and costs of alternative policies.

- Consider alternatives to infrastructure or subscribership subsidies.

- Encourage facilities-based competition.

- Arrange for independent retrospective analysis of outcomes and costs.

[77] NOTICE OF INQUIRY at para. 1.