

In the Matter of)
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Modernizing the FCC Form 477 Data Program) WC Docket No. 11–10
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The National Telecommunications and Information Administration (NTIA), as the President’s principal adviser on telecommunications and information service policy, and as one of the leading Federal agencies in the collection, analysis, and dissemination of data relevant to broadband availability and adoption, respectfully comments on the *Further Notice of Proposed Rulemaking (Further Notice)* in the above-captioned proceeding.¹ Recognizing the importance of data-driven decision making, NTIA applauds the Commission’s efforts to improve the quality, accuracy, and utility of Form 477 data.

For decades, NTIA has leveraged data to understand the state of communications and information infrastructure and use in the United States, and to develop policies to promote the availability and use of robust broadband services across the country.² NTIA, in collaboration with the Commission, pioneered the collection of extensive broadband deployment data when it

² 47 U.S.C. § 901 *et seq.*

launched the State Broadband Initiative (SBI) in 2009.³ Through this program, established by Congress, NTIA worked with every state, territory, and the District of Columbia to collect fixed and mobile broadband availability data for over 11 million Census blocks every six months for several years. To make these data accessible to a broad audience, NTIA launched the National Broadband Map (NBM) in 2011.⁴ Although the SBI program ended in 2015, NTIA continues its extensive work to collect, analyze, and disseminate data relevant to broadband availability and adoption.

NTIA analysts routinely refer to the Commission's Form 477 data, including both deployment and subscription data, to help inform policymakers and enhance our technical support of broadband infrastructure investment. Further, through our ongoing work with the State Broadband Leaders Network, which evolved from the SBI, we understand how states, nonprofits, and other stakeholders use Form 477 data, and in some cases collect their own state-specific data.

Separately, NTIA has extensive experience collecting data on broadband adoption and usage in the United States, creating decades of datasets that complement the Form 477 data collections on broadband deployment and subscription. Since 1994, NTIA has periodically partnered with the Census Bureau (Census) to survey approximately 53,000 U.S. households on their Internet and computer use. NTIA's questionnaire, administered as a supplement to Census's Current Population Survey (CPS), includes more than 50 questions to gather a wealth of information on household and individual Internet use and demographics, including the locations, technologies, and devices that people use to go online, their online activities, and the reasons

³ See <https://www2.ntia.doc.gov/sbdd>.

⁴ See "About the National Broadband Map," at <https://www.broadbandmap.gov/about>.

why some Americans still do not utilize these technologies. Whereas Form 477 focuses on broadband availability and subscription data gathered from service providers, NTIA's CPS Supplements provide detailed information on adoption and usage of the Internet, as reported by households across the country. The NTIA surveys, together with the FCC's Form 477 and three recently added household broadband adoption questions on the American Community Survey, comprise a valuable, holistic set of Federal data sources related to broadband.

The CPS Supplements provide the basis for NTIA's Digital Nation research series and online data tools, like the Data Explorer visualization tool.⁵ To ensure public accessibility and usability, NTIA maintains these datasets on the Data Central section of its website, along with complete technical documentation and sample statistical code.⁶ This research informs NTIA's leadership, other policymakers, researchers, local leaders, and businesses trying to understand broadband usage in their area and the online landscape at large. NTIA's efforts to make its data accessible by a broad range of users could provide helpful guidance for other Federal data collections, including the Form 477 program.

The Form 477 data program is impressively large and useful, and benefits broadband policy research and decision making, as well as the FCC's internal needs. The Form 477 program draws a diverse audience of data users, encompassing federal policymakers, national business leaders, local government, businesses, and community groups and anchor institutions, and more traditional academic and think-tank researchers. NTIA urges the Commission to implement program enhancements that further benefit as many of these data users as possible.

⁵ See <https://www.ntia.doc.gov/data/digital-nation-data-explorer>.

⁶ See <https://www.ntia.doc.gov/data>.

As our recommendations below indicate, NTIA believes that the most important areas for improvement in the Form 477 data collection program are data accuracy and public accessibility. To improve accuracy, NTIA urges the Commission to ensure the validation of data submitted by providers, create a streamlined data correction mechanism, and clarify the definition of a “served” area. In order to improve public accessibility of Form 477 data, the Commission should seek to release datasets more quickly and with more public information. Additionally, the Commission could make available data tools—including visualization and mapping tools like the NBM—that are more sophisticated and intuitive for a wide range of users.

Increasing data granularity—which we view as a separate issue from accuracy—may be a third focus area, but it should not come at the expense of the first two.⁷ Should the Commission choose to pursue an increase in granularity of fixed broadband deployment data, NTIA recommends focusing on the small portion of Census blocks that are large enough to make intra-block variation more likely. This strategy could mitigate increased burdens on providers, while avoiding unnecessary complexity in the majority of areas where Census blocks are sufficiently small.

While we recognize that improving data accuracy and accessibility may increase the burden on both service providers and the Commission, these steps would be very valuable to the

⁷ We refer to accuracy as the extent to which data are reported correctly and precisely identify the broadband status (technology, speed, etc.) of the specified geographic area (Census blocks or tracts). Granularity refers to the level of geographic detail, where smaller geographic areas are more granular. Although they are often referred to in similar contexts, these two concepts are not necessarily complementary. Increasing the granularity of reporting to the sub-Census block level, for example, does not improve accuracy if the data collection procedures themselves do not yield correct data. Both improving accuracy and increasing granularity are laudable goals, and both would likely require additional resources for the Commission as well as service providers. It is unclear, however, how much additional useful information may be learned by increasing granularity without first improving accuracy.

Commission’s effort to provide an accurate picture of broadband in the United States. We also identify several areas in which the burdens of data collection could be reduced, such as reducing the frequency of data collections.

II. THE COMMISSION SHOULD PRIORITIZE THE ACCURACY OF DATA REPORTED BY PROVIDERS AND PRESENTED IN PUBLIC DATASETS.

Increasing accuracy is the most important factor for improvement in the Form 477 data program. Data resulting from submissions of numerous and diverse providers using different methodologies are bound to contain inaccuracies. Moreover, it is unlikely that such inaccuracies occur completely at random, potentially leading to upward- or downward-biased estimates of broadband availability in certain regions. Therefore, NTIA strongly recommends implementing a data validation program and related measures to improve the accuracy of Form 477 deployment data.

In the SBI program, the validation of data supplied by individual providers of broadband Internet access service was one of the most critical reasons NTIA’s NBM was so valuable. The validation primarily occurred at the state level, with NTIA itself conducting additional checks. Each state’s SBI grantee provided NTIA with detailed methodological specifications, which were made publicly available on the NBM data download page.⁸ SBI grantees performed a number of activities to gather and verify the information collected, including holding meetings with community leaders, reviewing providers’ maps and engineering assets, and comparing provider data with aerial imagery or other state-owned data to confirm physical assets. Some SBI grantees performed drive tests for mobile broadband service on roads and highways—yielding

⁸ See <https://www.broadbandmap.gov/data-download>.

valuable information about the actual extent and strength of mobile data service in several states—and completed manual speed tests of website downloads. NTIA also required states to explain unusually large changes in broadband availability between one reporting period and the next. This multi-step review and verification process ensured the accuracy of the information submitted. State-based validation is not the only way to implement a validation program, and the Commission may find different methodologies to be more effective in the context of Form 477 deployment data. That said, we urge the Commission to confer with some remaining state programs, such as those in Maine, Minnesota, North Carolina, Utah, Virginia, and Wisconsin, to explore relevant best practices.

NTIA also recommends that the Commission create a streamlined mechanism for the public to correct invalid data or otherwise offer feedback on provider data. The present requirement to file a formal comment is too burdensome to encourage constructive responses from individual stakeholders. In the case of broadband deployment, local governments and even individuals may in some cases be in the best position to validate the data. The Commission should develop a methodology for reviewing and responding to public input—in concert with broadband service providers—aimed at meaningful data quality improvement. This process should be streamlined and efficient, and avoid being overly burdensome to small, particularly rural providers. For example, the FCC might consider a minimum coverage or subscriber threshold under which providers would be exempt.

In addition, NTIA suggests clarifying the criteria used to determine when a provider “serves” a particular Census block. We concur with the Commission that it is difficult to ascertain current service availability from the data as reported. Fixed broadband deployment data from Form 477 currently represent areas which a broadband provider serves or *could* serve

without an extraordinary commitment of resources.⁹ However, there is little guidance as to what constitutes an “extraordinary commitment”—and it is likely that individual service providers interpret this guidance differently.

For example, some service providers might identify areas where they currently serve or can accept customers, whereas other providers may also include areas they could only serve following significant construction, possibly at additional cost to the prospective customer. To more accurately capture areas currently served or very likely to be served, NTIA recommends that covered Census block data only include areas currently served and areas that the provider expects to serve or could serve, upon request, within a maximum timeframe of several weeks or months, at the reasonable expense of the provider. This would also avoid the risk that individuals or a community could understand from Form 477 data that they can get access to service, only to learn that such access might be extremely costly or not be available for a long period of time.

III. THE COMMISSION SHOULD ENHANCE THE PUBLIC ACCESSIBILITY OF FORM 477 DATA BY INCREASING THE PUBLICLY AVAILABLE DATA AND PROVIDING TOOLS THAT ENABLE USABILITY AMONG A BROADER AUDIENCE.

Data users would benefit significantly from quicker public release of more data about both broadband deployment and subscription. NTIA supports the Commission including more fields in the public deployment datasets. Information about minimum, as well as maximum advertised broadband speeds, for example, would be especially helpful for understanding broadband service availability and competition.

In the recent past, the Commission has made data public roughly a year after provider submissions were complete. Even as we urge the Commission to implement data validation

⁹ Further Notice at ¶ 33.

processes, we encourage it to ensure earlier public release of accurate data. NTIA appreciates the challenge of addressing these potentially conflicting goals. Nonetheless, it is critical that all stakeholders, including possible new entrants, have access to as current data reflecting broadband markets as possible. More timely datasets can be more effective inputs for making policy decisions and identifying unserved and underserved areas.

As wireless technology advancements boost broadband speeds to be competitive with wireline speeds,¹⁰ recent trends in Internet usage suggest that customers are increasingly substituting mobile data plans for fixed subscriptions at home.¹¹ Moreover, if mobile wireless providers continue to offer more unlimited data subscriptions, customers may be more willing to consider substituting mobile for fixed broadband services at home. If these trends continue (and they likely will), it will become even more important that data for mobile and fixed services be directly comparable at the Census block level. To understand the extent and pace of wireless substitutability, NTIA supports the Commission proposal to make minimum and advertised wireless speeds available by service provider and Census block for both fixed and mobile broadband.

In some cases, however, more generality could in fact be useful, particularly for mobile deployment data. Policymakers, spectrum managers, and researchers could benefit from knowing generally what specific frequency bands providers are deploying for each technology. For example, this information could assist NTIA and others in evaluating current spectrum usage and planning for future spectrum needs. Nonetheless, the Commission has not released such data at

¹⁰ See, e.g., FCC, “20th Mobile Wireless Competition Report Quick Facts,” <https://www.fcc.gov/20th-mobile-wireless-competition-report-quick-facts>.

¹¹ See, e.g., <https://www.ntia.doc.gov/blog/2016/evolving-technologies-change-nature-internet-use>.

the most disaggregated level.¹² NTIA supports the proposal to lessen the burden on wireless providers by eliminating the requirement that they provide their disaggregated deployment data by unique frequency band.¹³ In its place, NTIA recommends that the Commission require wireless providers to submit a list of frequency bands and technologies at a more aggregated geographic level, for example by the spectrum license area unique to each band.

NTIA further supports the Commission in continuing to make mobile broadband data by technology (without frequency information) available at the Census block level. Regarding technology categories, NTIA would also support the Commission's proposal to consider four categories (3G, 4G non-LTE, 4G LTE, 5G) of mobile technologies as sufficient.¹⁴ This could help offset any increased burdens from improving accuracy and reliability.

Currently, the mobile provider datasets identify carriers based on "doing business as" (DBA) names, which are not always consistent for the same carrier across markets. By introducing a unique carrier identifier similar to the holding company identifier used in the fixed data, the Commission would greatly facilitate the accessibility and usability of the Form 477 mobile wireless data. The FCC could also employ an approach similar to the "Common Names" it applies in the Spectrum Dashboard context.

For many users, simply making more data available in raw form is insufficient to enhance their utility for research and analysis. Over the years, we have heard from a number of researchers and other stakeholders who do not have the resources to turn raw datasets into a usable format. While the open nature of the raw data enables external users to develop data tools,

¹² Further Notice at ¶ 18.

¹³ Further Notice at ¶ 19.

¹⁴ Further Notice at ¶ 20.

the Commission should continually update the existing NBM with the most recent Form 477 deployment data to ensure access for those users who cannot perform their own sophisticated mapping. Alternatively, the Commission could provide other mapping functionality that is more sophisticated and accessible than the limited maps it currently produces. While the raw Form 477 deployment datasets are extremely useful to many researchers, the Commission could greatly expand the audience for these data by enhancing their accessibility with tables, charts and maps, granular visualization tools for both localized areas and specific technologies, and other mechanisms that summarize the information. NTIA recognized the value of such features when creating the NBM, and continues to update its Digital Nation-related products with user-friendly features that facilitate the availability and clarity of the underlying data.¹⁵

Specifically, NTIA recommends several ways the Commission can make the broadband deployment map more effective. First, it should enable users to customize the speeds and technologies on display, and to receive contextual information as they zoom in on particular localized communities. Second, the Commission could provide an additional map layer identifying community anchor institutions, public housing, and other important landmarks.¹⁶

Finally, the Commission should supplement a full-featured map by releasing sample code demonstrating how it analyzes the raw datasets. Researchers have responded favorably to NTIA's posting of sample code on the Data Central section of the agency website. Similarly, the Commission's sample code could be very helpful to researchers and data analysts who wish to

¹⁵ See, e.g., <https://www.ntia.doc.gov/blog/2017/ntia-data-offers-window-understanding-veterans-computer-and-internet-use>.

¹⁶ NTIA included similar functionality in the NBM. See <https://www.broadbandmap.gov/community-anchor-institutions>.

use Form 477 data in their own studies. Given our experience and interest in this area, NTIA stands ready to serve as a resource in making broadband deployment data more accessible.

IV. INCREASING GRANULARITY OF FIXED BROADBAND DEPLOYMENT DATA MAY BE USEFUL, BUT THE COMMISSION SHOULD NOT SACRIFICE DATA ACCURACY.

The prospect of sub-block granularity in fixed deployment data is intriguing, particularly for large Census blocks. The Commission, however, should carefully implement any increase in granularity to minimize potential resulting losses in data accuracy caused by diverting either Commission or service provider resources from accuracy to granularity. For example, the Commission could consider requiring sub-block fixed deployment data only for geographically larger blocks, as described below. More broadly, we encourage the Commission to favor improving the accuracy of block level data over increasing granularity, should there be significant resource tradeoffs. Should the Commission want to enhance granularity of its fixed deployment data, we offer the following observations and considerations.

There are likely several factors contributing to erroneous fixed broadband deployment data, including variation in broadband access within the Census block and more basic misreporting of the service level for the entire Census block. It is generally unclear whether incorrect data for a particular location is the result of variation in broadband coverage within the Census block or incorrect block-level data. To identify areas where inaccuracies were more likely to be caused by variation within a Census block, NTIA collected some sub-block data in the SBI by specifically targeting Census blocks larger than two square miles.

By limiting the requirement for collecting sub-block data to larger Census blocks, the Commission could substantially reduce the resulting burden on providers. For example, just 2 percent of Census blocks located in the 50 states and District of Columbia—a total of 253,295

out of over 11 million blocks—exceed two square miles in land area. And less than two-thirds of these large Census blocks (158,871) had non-zero populations during the 2010 Census.¹⁷

Approximately 3 percent of the population, or over 9 million people, reside in these blocks.

Although the Commission may find NTIA’s experience with sub-block data collection to be informative, we also recognize that a variety of possible methodologies exist for capturing accurate sub-block data. The Commission may look to its own sophisticated method for estimating the growth and location of housing units and population since the most recent decennial Census.¹⁸ These estimates could be used to project, for example, where persons reside within large Census blocks, and ask providers to just report the proportion of persons served in those blocks. Alternatively, the Commission could request that broadband service providers report service areas as polygons, road segments, or other geographic representations, rather than in terms of Census blocks. Then using its estimates, the Commission could project the total numbers of housing units and population covered.

V. THE COMMISSION SHOULD MITIGATE ADDITIONAL BURDENS BY MOVING TO ANNUAL DATA COLLECTION.

NTIA recognizes that some of our recommendations, as well as other commenters’ proposals, would add to the burden on providers and the Commission. NTIA supports moving to annual collections to mitigate these burdens resulting from recommended enhancements in data accuracy and public accessibility. Although broadband in the United States is a dynamic and evolving service, NTIA believes that the difference between snapshots every year versus six

¹⁷ *Source:* Census Bureau 2010 Decennial Census data and NTIA calculations. If the threshold were one square mile, it would cover 5 percent of blocks (608,399), of which just over 2/3 are populated (410,753). These blocks contain 7 percent of the population, or 21 million people.


¹⁸ See <https://www.fcc.gov/reports-research/data/staff-block-estimates>.

months is not worth the added cost to the industry or the Commission (and as noted above, savings from reducing frequency should be put toward ensuring accuracy). Once it modernizes the Form 477 program, the Commission may also wish to consider providing training or other resources to covered providers, especially smaller ones, to assist in providers' accurate filing.

VI. CONCLUSION

For the reasons discussed above, NTIA respectfully urges the Commission to modernize its Form 477 Data Program in a fashion that prioritizes data accuracy and public accessibility. If it would be helpful as the Commission moves forward with Form 477 program improvements, we would welcome an opportunity to share our experience in more detail.

Respectfully submitted,


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