

**Before the  
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION  
and the  
NATIONAL SCIENCE FOUNDATION  
Washington, DC**

In the Matter of )  
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National Broadband Research Agenda ) ET Docket No. 160831806803-01

**COMMENTS OF THE CITY OF CHICAGO  
ON THE DEVELOPMENT OF A NATIONAL BROADBAND  
RESEARCH AGENDA**

The City of Chicago submits these Comments in response to the National Science Foundation (NSF) and National Telecommunications and Information Administration (NTIA) Public Notice published on September 9, 2016 seeking comments on informing the development of a National Broadband Research Agenda.

**Introduction**

The City of Chicago applauds the National Telecommunications and Information Administration (NTIA) and the National Science Foundation (NSF) for their efforts in developing the National Broadband Research Agenda (Agenda). The City of Chicago appreciates the opportunity to submit its comments and is committed to helping shape the Agenda in hopes that it will assist in removing barriers to broadband deployment and adoption.

High-speed Internet is becoming increasingly essential for both residents and businesses. Chicago is committed to making this resource available by engaging private companies, universities, and other organizations to build a world-class broadband infrastructure, increase options for broadband service in underserved areas, and provide free Wi-Fi access in public spaces across the city. Achieving these goals will support public and private technology initiatives citywide and will help residents and businesses become more digitally-connected.

**About the City of Chicago**

In fall 2013, Mayor Rahm Emanuel released the City of Chicago’s first ever Technology Plan, a framework for the city to maintain and expand its leadership and build its commitments to modern infrastructure, smart communities, and technological innovation. The Plan highlights initiatives and strategies that together help ensure Chicago is a City where technology fuels opportunity, inclusion, engagement, and innovation. Chicago is committed to implementing

policies that make the City friendly to urban technology experimentation—allowing Chicago to become a global leader in environmental sensing, spectrum research, and wireless connectivity, while enabling researchers to develop solutions to city problems.

Chicago seeks make every neighborhood a “smart community,” where our residents and businesses are able to fully participate in the digital economy. Increasing access and building the digital skills among our residents and businesses yields increased job placement, broadband market demand, and business growth opportunities. Through school- and community based efforts, the City has helped make technology relevant to residents’ and businesses’ needs and interests. The City has partnered with community leaders, nonprofits, and businesses to develop best practices from local research and programs, such as the Smart Communities initiative.

Chicago has long been committed to understand technology access and use in Chicago. In 2008, Chicago partnered with the University of Illinois Chicago and the University of Iowa to conduct the first citywide survey that would help determine patterns of access and use at a neighborhood-level. The results of this survey were published in [Digital Excellence: A Citywide View of Technology Use](#) in 2009. This neighborhood-level data was critical to meaningful planning and targeting digital inclusion activities in our city. The data also informed the City’s [Smart Communities Master Plan](#) and Broadband Technology Opportunities Program (BTOP) grant applications.

Chicago’s Smart Communities program, which received a \$7 million Sustainable Broadband Adoption (SBA) grant as a part of BTOP, aimed to create a “culture of digital excellence,” in nine low and moderate-income community areas of the city of Chicago. Evaluating the impact of the programs in these communities was built into the program design. Two additional citywide surveys were conducted in 2011 and 2013 at different points during and post-BTOP programming implementation. In addition, focus groups and targeted surveys with program participants were conducted. Using mixed methods and addressing results for the neighborhood, residents, and community organizations, the follow-up studies focused on the following:

- **Neighborhood-level change in the Smart Communities, compared to other Chicago community areas.** Given the emphasis on creating a culture of technology use in the communities, examining change at the neighborhood level is a fundamental part of this evaluation. Using multilevel (hierarchical) statistical models and neighborhood estimates drawn from citywide surveys in 2008, 2011 and 2013, the analysis shows the Smart Communities experienced a greater rate of growth in Internet use, home broadband adoption, and several activities online, compared to similarly-situated Chicago community areas. The differences are large and statistically significant. Chicago is the only U.S. city to have neighborhood-level data over time, and so this report offers a rigorous and nationally significant study of the effects of a BTOP initiative.<sup>1</sup>

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<sup>1</sup> See Mossberger, Tolbert, and Anderson (2014). *Measuring Change in Internet Use and Broadband Adoption: Comparing BTOP Smart Communities and other Chicago Neighborhoods [Updated 2014]*. Retrieved from [https://copp-community.asu.edu/sites/default/files/REVChicagoSmartCommunitiesCHANGE042514-final%20\(2\).pdf](https://copp-community.asu.edu/sites/default/files/REVChicagoSmartCommunitiesCHANGE042514-final%20(2).pdf)

- **An in-depth examination of outcomes, benefits and challenges for participants at the FamilyNet Centers.** This is the largest program, open to all residents, and this study complements the neighborhood-level data by showing what participants are doing online, the benefits they perceive from Internet use, and continued needs for the future. Questions were also asked about sharing of computers and Internet connections with neighbors, to understand whether this might have contributed to neighborhood change. The FamilyNet Center model integrates technology training with other assistance and activities, and was initially implemented within six LISC Chicago-led Centers for Working Families. The free Internet skills training was offered in English and Spanish. Although the federal funding through the Broadband Technology Opportunities Program (BTOP) ended in January 2013, the centers have since been expanded to 12 sites through funding from Americorps, the City of Chicago, and Comcast, and so this report may offer guidance for future program delivery. Among the outcomes tracked in the follow-up survey of participants were Internet use, broadband at home, self-reported skills, activities online, and self-reported benefits attributed to Internet use.<sup>2</sup>
- **Results for community organizations, for providing technology leadership in the community.** The Civic 2.0 training was a distinctive program that offered training in Internet use for community leaders to enable them to find resources for their communities and to access data and information online about neighborhood issues. The courses were taught by Tech Organizers who worked with community groups and did more general outreach. A follow-up survey of 231 individuals that were Civic 2.0 participants showed the following:

  - Seven in ten had research policy issues since taking the courses, and over 50% had accessed other information online.
  - Nearly half the respondents – 45% - said they used the neighborhood data portals after the classes.
  - Fewer respondents engaged in contacting, posting or commenting, and a small minority (under 10%) created websites, blogs or Facebook pages after the class.
  - Nearly half of the participants said they had more online interaction around neighborhood issues following the classes.<sup>3</sup>

These surveys and the resultant studies helped to determine that and have informed additional digital inclusion investments made through the [Connect Chicago program](#), which Mayor Emanuel announced in April 2016.

Chicago has a track record of convening partners across sectors to meet challenges. Based in Chicago, UI LABS is a major shared research organization focused on creating partnerships

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<sup>2</sup> See Mossberger, Feeney, and Li (2014). Smart Communities Evaluation: FamilyNet Centers. Retrieved from [https://live-policyinformatics.ws.asu.edu/sites/default/files/%5Bterm%3Aname%5D/%5Bnode%3Acreate%3Acustom%3AYm%5D/smartcommunities\\_familynetcenters.pdf](https://live-policyinformatics.ws.asu.edu/sites/default/files/%5Bterm%3Aname%5D/%5Bnode%3Acreate%3Acustom%3AYm%5D/smartcommunities_familynetcenters.pdf)

<sup>3</sup> See Mossberger, Benoit Bryan, and Brown (2014). Smart Communities Evaluation: Civic 2.0 Participant Surveys and Interviews with Partner Organizations. Retrieved from [https://live-policyinformatics.ws.asu.edu/sites/default/files/%5Bterm%3Aname%5D/%5Bnode%3Acreate%3Acustom%3AYm%5D/smartcommunities\\_civic2surveyinterviews.pdf](https://live-policyinformatics.ws.asu.edu/sites/default/files/%5Bterm%3Aname%5D/%5Bnode%3Acreate%3Acustom%3AYm%5D/smartcommunities_civic2surveyinterviews.pdf)

between industry and research universities to create new technologies and businesses. UI LABS and partners are focusing on bridging technology and manufacturing. UI LABS received a \$70 million grant from the Department of Defense to establish the Digital Manufacturing and Design Innovation Institute as part of the National Network for Manufacturing Innovation. The proposal involved top research universities led by the University of Illinois and Northwestern University, large companies, including Boeing, Caterpillar, and Microsoft, and venture funds, including Andreessen Horowitz, Lightbank, and New Enterprise Associates. Further City Digital, which is part of UI LABS, uses Chicago as a testbed for technology and demonstration, focusing on four critical impact areas: Energy Management, Physical Infrastructure, Transportation, and Water and Sanitation. City Digital, together with its public, private and academic partners, identifies programs and pilots that focus on value which can only be unlocked through collaboration and coordination of partners and data to improve the design, creation, use, interactivity and impact of urban infrastructure. City Digital enables experiments at scale to develop real solutions for the marketplace, so that, if successful, they can continue and be extended to have impact in other cities.

Chicago is also a partner in the NSF-funded Array of Things (AoT) program.<sup>4</sup> AoT is a network of interactive, modular sensor boxes that are being installed on street poles around Chicago, and in other cities around the world, to collect real-time data on environment, infrastructure, and activity for research and public use. The project is led by the Urban Center for Computation and Data of the Computation Institute, a joint initiative of Argonne National Laboratory and the University of Chicago. The project also involves partnerships with scientists at academic institutions including Northern Illinois University, University of Illinois at Chicago, University of Illinois at Urbana-Champaign, DePaul University, Illinois Institute of Technology, Purdue University, University of Notre Dame, Arizona State University, the Santa Fe Institute, University College London, Clemson University, and the Institute for Advanced Architecture of Catalonia.

Finally, the City plays a key role in implementing broadband deployment through its management and stewardship of the public right-of-way (ROW). Multiple city departments, led by the City's department of transportation, work with industry to coordinate advanced broadband deployment. The City's goal is to strike a balance between facilitating deployment of advanced broadband infrastructure with careful stewardship of the City's dense, layered ROW and public spaces.

### **Responses to Questions from this Docket**

#### ***4. What are the critical data and research needs in the areas of broadband deployment and access?***

Additional research is needed to better understand broadband deployment and access patterns generally and at the neighborhood-level. Having access to more open, granular data on wireline and mobile subscriptions and pricing would help target improvements and address policy

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<sup>4</sup> See <http://arrayofthings.github.io/>

questions. In addition, there is also a need for research regarding how best to facilitate broadband deployment in dense, urban environments like Chicago where ROW space is limited.

First, more research and analysis of local wireline competition is needed. How does pricing influence at-home broadband adoption? How does the presence of two, three, or more wireline providers influence the price, speed, and infrastructure upgrades? How will modernized policy interventions like Lifeline influence local competition and pricing?

Second, more research is needed on the role anchor institutions play in community access. In Chicago, parks, libraries, and schools all play a role in community connectivity. Do public computing and free Wi-Fi programs supplement at-home use, spur new at-home use, or replace at-home use? How does the role of anchor institutions vary between communities? Studying these questions can inform local investments and partnerships.

Third, more research is needed on the interaction of mobile and at-home wireline Internet access and utilization. Applying for jobs, applying for a college, and filing taxes might be a challenge to accomplish on a mobile device and through mobile subscription alone. Who are the Americans that rely exclusively on mobile subscriptions? How does their use of their Internet access differ from those with wireline access or wireline and mobile access? What are the implications of high mobile-exclusive users to local economic and civic health?

Finally, the City also encourages NTIA to support directly and to coordinate needed research on the physical infrastructure that will be necessary to achieve deployment and access goals. Chicago's dense, urban built environment, with a ROW already full of legacy physical plant, creates implementation challenges for both industry and the City itself. The City devotes significant resources to ROW coordination and management. We believe NTIA could support research focused on analysis of physical deployment strategies. For example, NTIA could conduct additional research on use of multi-function street poles engineered for use by multiple broadband providers. This is research that is especially well-suited for the federal government to take up, given its ability to convene industry, local governments and other participants. In our experience, this is an area that deserves more research focus.

#### ***10. What are the critical data and research needs in the area of broadband and its economic and social impact?***

To determine the economic and social impact of broadband access, the field needs more outcomes-based evaluations and more longitudinal studies to understand the impact of broadband access, broadband utilization, and high-speed broadband for households and communities. Filling this research gap could guide local and nonprofit work. It could also evaluate the social and economic impacts of new federal interventions like the modernization of Lifeline.

There is an opportunity to understand how broadband investments translate to other community benefits. We recommend that the NSF and NTIA prioritize research on how broadband access and utilization impact the following socioeconomic categories: financial health and literacy,

educational outcomes and college readiness, civic engagement metrics (voting, service, etc.), and public health. Of course, since projected positive outcomes of information access are not fully known and difficult to capture, the NSF and NTIA can encourage mixed method research incorporating qualitative data gathering to measure quality of life, confidence, and unpredicted impacts that do not fall within one of the predicted outcome categories.

It should also be noted that the cost-benefit analysis of next generation broadband infrastructure on the city and state level is also relatively understudied. Translating socioeconomic outcomes into projected costs and savings to local and state governments could inform local strategic broadband plans and infrastructure financing.

***13. What opportunities exist to improve the sharing of research from federal research programs with external stakeholders (e.g., industry, academia)? Likewise, how can external stakeholders better share their research with federal agencies?***

The federal government can play an important coordinating and convening function when it comes to broadband access, adoption, and outcomes research across sectors.

To that end, Chicago supports the NTIA’s Community Connectivity Initiative to develop “new tools to support communities working to accelerate broadband deployment, deepen broadband adoption, strengthen local policies, and use broadband to advance local priorities.”<sup>5</sup> This Initiative is a step towards strengthening and increasing broadband data collection and research. The Community Connectivity Initiative has the potential to coordinate research and research needs across localities, industry, and universities.

After the foundation and relationships built during BTOP, the NTIA could be a compelling center for gravity for broadband research coordination, collaboration, sharing and benchmarking. The NTIA’s plans to co-create a national connectivity assessment tool and a community connectivity framework with municipalities would add value. The Smart Chicago Collaborative, a civic organization dedicated to improving lives through technology, participates in this work. We see Chicago’s participation in the Community Connectivity Initiative as supporting and guiding the Connect Chicago initiative<sup>6</sup>, our citywide initiative to close digital access & skill gaps. There is also an opportunity for the NTIA, through the Community Connectivity Initiative, to create common standardized terms and definitions to ensure comparability of data across the country.

In conjunction, the federal government can improve research sharing by leveraging existing organizations like UI LABS, who excel at bringing together partners across sectors to share research, co-develop, and speed solutions to market.

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<sup>5</sup> See <http://www2.ntia.doc.gov/CCI>

<sup>6</sup> See <http://connectchicago.org>

Finally, the federal government, can as a requirement of any grant, require that data collected as a result of any grant program be published openly and in machine-readable formats through open data portals like Data.gov.

***14. What are the suggestions for enhancing cross-disciplinary collaboration in broadband research?***

We recommend that the federal government explore the possibility of facilitating cross-disciplinary collaboration in broadband research as a convener and a grant maker. While the NTIA is already beginning to fulfill the convener and leader role through the Community Connectivity Initiative, federal funding can spur this work further. Either the NTIA or the NSF can incentivize or facilitate cross-disciplinary outcomes-based evaluations through a new grant program.

Further, cities and local governments, as key community service providers, can play a key role in these grants, bringing together partners across sectors and disciplines—public health, economic development, education—to facilitate more outcomes-based research.

***16. Are there opportunities to collect new broadband-related data or expand current data sets within federal programs that fund and/or produce research?***

There are several opportunities for the federal government to improve and expand current data collection. The first and perhaps most important task would be to improve the existing public data sets on wireline subscriptions. A specific example of an improvement would to make the Federal Communications Commission's Form 477 data is available as a continuous variable rather than as a rating by census tract.

For the benefit of all researchers, the federal government – both the NTIA and the Census Bureau — can attempt to understand and share best practices for surveying Americans on broadband access. For instance, the American Community Survey (ACS) asks respondents if they have Internet access or an Internet subscription, what type of Internet access they have, and if they have a computer in their home. It is not clear how accurate the resulting data is. It would be useful to know if, based on the way questions are organized or how technical terminology is used, questions can be misleading. For instance, it is possible that ACS respondents could be underreporting when they have multiple types of Internet subscriptions. Understanding any measurement bias or surveying problems that the ACS has experienced in its first years of reporting these data would inform other researchers and cities undertaking their own surveying projects.

Finally, the NTIA and NSF should leverage their work in other related areas—whether it's in support of the National Public Safety Broadband Network, or the Advanced Wireless Research Initiative to identify new data sets that should be collected—for example, spectrum usage. How is wireless spectrum being used and how can it be used more effectively to address the proliferation of data that will be available through the Internet of Things? Through additional investment,

citywide platforms, like the Array of Things, can also be leveraged in the Agenda to collect new data.

**Conclusion**

The City of Chicago supports the NSF and the NTIA in their initiative to develop a National Broadband Research Agenda. Chicago’s deep experience convening stakeholders across sectors to meet common goals, commitment to advancing affordable broadband access, as well as our experience facilitating deployment of research platforms and advanced technologies, has informed the comments submitted to this joint public notice. We look forward to the development of the Agenda, and continuing the conversation with the NSF and the NTIA.

**City of Chicago**

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