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Broadband Technology Opportunities Program
U.S. Department of Commerce
Room 4812
1401 Constitution Avenue, N.W.
Washington, D.C. 20230

Re: Docket No. 090309298-9299-01
American Recovery and Reinvestment Act of 2009 Broadband Initiatives

To Whom It May Concern:

On March 12, 2009, the National Telecommunications and Information Administration (NTIA) and the US Department of Agriculture (USDA), Rural Utilities Service (RUS) of the US Department of Agriculture (USDA) issued a joint Request for Information (RFI) seeking comments regarding the NTIA's implementation of the Broadband Technology Opportunity Program (BTOP) and the USDA's Distance Learning, Telemedicine, and Broadband (RUS) program of the ARRA of 2009.

These comments submitted by CIO/OFT and CSCIC are limited to the issue of broadband mapping (Question 8 of the RFI) and are intended to supplement and amplify New York's comments previously submitted.

Question 8 – Broadband Mapping
8.a. *What uses should such a map be capable of serving?*

The map should not be created as "just a map", but as an analytical tool utilizing information layers in a Geographic Information System (GIS) that can be combined and queried in combination with countless other information layers. In New York, we have created and amassed more than 500 other statewide layers of information and the ability to analyze our broadband layers in the context of this other information makes it a very powerful and important tool. GIS is more than a tool to answer the "*where*" question, it provides a multi-dimensional way to visualize complex data and understand relationships among the data. In order to maximize the potential uses of the broadband mapping in GIS, the broadband map layers should be openly published, without licensing or usage restrictions, in accordance with public safety considerations and legal requirements.

The key is to use the broadband mapping in GIS to support data-driven decisions based on factual analysis of real data, rather than on perceptions, or aggregate trends, or other vague indicators that may obscure the details relevant to sound decision-making. Some examples include:

- Exploring census demographic data to better understand factors related to digital literacy and where to target programs that address digital literacy.
- Analysis of broadband availability to businesses. We use the Dunn & Bradstreet business inventory database which contains extensive information and locations for business entities across the State. Natural business corridors along transportation routes can be analyzed, for example, to prioritize delivery of high capacity broadband infrastructure that would support these business corridors, possibly in conjunction with economic development initiatives.
- Investments in health information technology that allow hospitals, labs, pharmacies, doctors offices, clinics, insurance companies, and other health care facilities to seamlessly share information are dependent upon broadband to connect these facilities. All of these can be analyzed in GIS to determine where gaps exist.
- Schools are increasingly interested in the interaction between home and school via the Internet to post assignments, share documents, turn in assignments, communicate with parents, and more. We have begun analyzing the availability of broadband for each of the State's 730 school districts to identify gaps and opportunities.

b. *What specific information should the broadband map contain, and should the map provide different types of information to different users?*

In general, the map should be publicly released to the maximum extent, in accordance with public safety considerations and legal requirements. There should be separate GIS layers for each type of broadband, such as cable-modem, DSL, direct fiber, 3G wireless, etc, with each layer able to be used independently in GIS. This is important since there may be different factors to consider for each broadband type and GIS analysis is likely to involve different combinations of data layers. The NTIA should publish its national broadband inventory map using these layers and supplemented with other GIS layers including US Census Bureau demographic data, various administrative and political boundaries, water bodies, roads, and other relevant information. The data from the newly revised FCC form 477, which includes details at the Census tract level on broadband technology, speed, residential and non-residential subscribers should also be added to the national broadband map as a GIS layer as soon as the new FCC data becomes available.

The broadband map should depict "last mile" infrastructure, that is, broadband services available directly to residential and business subscribers. So-called "backbone" infrastructure, such as fiber trunk lines and Point Of Presence (POPs), should be included in the map for purposes of planning infrastructure build-out, network redundancy, and other factors, but may not be appropriate for public release due to homeland security considerations.

c. *At what level of geographic or other granularity should the broadband map provide information on broadband service?*

In general it is desirable for the mapping to be at the highest practical resolution. In our case, we mapped cable-modem availability at the Census Block Group level, since our predictive model correlated well at that level. We experienced lower correlations with census tracts (larger units than block groups) and blocks (smaller than block groups). Minimally, the map needs to support decision-making on broadband investments at the community level. It is probably not necessary for statewide broadband maps to accurately depict broadband service availability at the household (individual street address) level. In fact, there are significant risks in attempting to support mapping at that level of detail since there are a wide range of particular "in the field" conditions which affect broadband service availability at the household level and it is likely that the mapping assumptions necessary on a statewide mapping project would oversimplify those factors. The new FCC form 477 data is at the Census Tract level and this should probably be the largest unit of geography utilized to create the national broadband maps.

d. *What other factors should the NTIA take in to consideration in fulfilling the requirement of the Broadband Data Improvement Act, Public Law 110-385 (2008)?*

Consideration should be given to treating the mapping as a prerequisite to awarding grants, since the lack of a state broadband inventory map indicates a lack of clarity on where gaps exist, how many households and businesses are affected, and the priority of one area over another. This approach has the important secondary benefit of providing a clear incentive to stakeholders, including broadband providers and community leaders, to participate it the mapping process. The collaborative process of creating and reviewing the map can serve an important role in establishing working relationships and consensus among stakeholders, paving the way for more efficient and effective grant implementation.

The mapping should support analysis by the NTIA so that grant applications can be screened, scored, and prioritized using real, objective data that adequately describe current broadband availability. To do so, the mapping will need to be consistent across all states, based on minimum content standards.

NTIA should consider developing methods to fairly evaluate broadband availability across the country. States containing large, densely populated urban areas will have overall broadband availability measures skewed by those large urban areas. The New York City metro area, for example, accounts for roughly half of the population of New York State, in a very small percentage of the State's land area. Broadband infrastructure is thoroughly built out in most of this area. Upstate New York, in contrast, has many gaps in broadband availability which impact hundreds of thousands of potential broadband users, but these appear to be a very low percentage of the State's total population.

e. *Are there State or other mapping programs that provide models for the statewide inventory grants?*

We believe the approach we have used in New York can serve as a very useful model for other states and for the NTIA's national broadband map.

We are in the final stage of completion on a statewide broadband mapping project. This effort is being conducted by the NYS Office of Cyber Security & Critical Infrastructure Coordination (CSCIC), the agency with statewide mapping and GIS coordination responsibilities. No outside resources or contractors, nor any additional funds were utilized for this project. The mapping project was initiated in November, 2008 in support of the New York State Council for Universal Broadband.

Current effort has been primarily focused on *availability*, as opposed to subscriber rates of wired broadband service (cable-modem and DSL) to residential households across the state. In addition, availability of 3G wireless broadband service has been mapped statewide. Fiber backbone and other infrastructure have previously been mapped.

Because of the difficulties with the timeliness, availability, and restrictions associated with proprietary data from the provider companies, New York's approach was to use only publicly available data. Our method entailed creating predictive availability layers (described below), review and validation of those layers through a process involving community review and review by the provider companies, and revising the map layers based on that review and validation prior to online publication by the state.

For the predicted cable-modem broadband availability, our method involved creation of a GIS predictive model of likely cable-modem build-out based on a cluster analysis of housing address densities. The model was calibrated and validated for one county through an on-site review of the maps by a cable provider company and the results were then correlated with population density data at the Census Block Group level and extrapolated statewide to create a statewide map of predicted cable-modem availability.

A similar coverage map of Digital Subscriber Line (DSL) availability was created by determining where telephone exchange switches offer DSL service. Some of this information was available from FCC filings, but much of it was obtained through an automated script which interrogated the website of the largest DSL provider to determine where DSL is available. Permission was granted by the company for us to run this script against their website and we shared our results with them afterwards. Further research for the small independent telephone companies generally involved phone calls to inquire about DSL availability in their operating footprint. When it was determined that a company provided DSL throughout an exchange area, a GIS polygon representation of the exchange was coded to indicate that the entire exchange was served. Once the DSL switches and exchange area research was complete, a buffer of 3.4 miles was applied to the switch locations and these buffer areas were combined with DSL coverage

from the independent telephone companies to yield a statewide map of predicted DSL availability.

Mapping of 3G wireless service was quite straightforward and involved "scraping" the coverage from online coverage maps provided on the websites of the four companies offering 3G wireless service in the state. The images (screen captures) of the coverage maps were registered and mosaiced in GIS and the edges of the coverage digitized to create a statewide layer for each of the provider companies. The resulting 3G availability mapping is thus a re-creation of the layers shown on the company websites for public consumption.

At this point in time, the state is commencing a review and validation process so that the mapping can transition from 'predicted' to 'validated'. We have created instructions and review materials for each of the state's counties (http://www.nysbroadband.ny.gov/maps/maps.htm) except for the 5 counties comprising New York City, where results of a comprehensive broadband study completed in 2008 will be incorporated in the statewide map. Targeted outreach for community review is taking place with Chief Information Officers (CIO's) in each county, who will coordinate community review within their respective counties. Review is also being targeted to provider companies through the respective statewide industry associations for cable television providers and telecommunications providers. We expect the review and validation process to be completed in May and make the corrections to the map shortly thereafter. The map will be coded to indicate all areas that have been validated. Participants in the review and validation process are being asked to provide contact information and to identify sources used to validate the maps as well as provide a confidence score (on a 1-5 scale) on any corrections they provide back to us.

Some key points concerning our process:

- Our process has been transparent, with regular reporting to the Broadband Council and its Action Teams, which include the stakeholders. This high level of transparency is consistent with the objectives of the ARRA.
- Since no proprietary data was used, there are no limitations on how the resulting map can be released or shared. Public confidence is highest when none of the information is restricted.
- The mapping proceeded more quickly since there was no delay associated with the need to negotiate and execute non-disclosure agreements with each of the relevant providers.
- The provider companies have been willing to participate in our process; they understand the need and value of the State having an accurate broadband map.
- There have been scattered, local efforts to assess, inventory and/or map broadband availability in parts of our State and those efforts are being incorporated into our statewide project.

- The overall level of effort on this project has been modest, with much of the work carried out part-time by a team of five GIS staff at NYS CSCIC over a period of four months.

A presentation file containing many graphical samples to illustrate our process as well as potential uses of the map is available at: http://www.nysgis.state.ny.us/events/documents/broadband_mapping.pdf.

f. *Specifically what information should States collect as conditions of receiving statewide inventory grants?*

NTIA should establish a set of minimum content standards for state broadband maps. Detailed content standards for the GIS layers including attribute fields, domains, map accuracy requirements, and other considerations are beyond the scope of these initial comments. Broadly speaking, we suggest that content standards include the preparation of separate GIS layers depicting the availability of each broadband type. The standards should also specify that broadband map layers should be freely releasable without licensing or usage restrictions, consistent with public safety policies and legal requirements. It is not necessary for states to collect demographic information, since that information is freely available in GIS format from the US Census Bureau and can be readily added to the GIS broadband layers. Similarly, it is not necessary for states to collect information that will be available on FCC form 477, which the providers must submit twice each year to the FCC. Commercially sourced data, such as business inventory databases from Claritas or Dunn & Bradstreet, can be licensed where public data sources are lacking.

g. *What technical specifications should be required of States grantees to ensure that statewide inventory maps can be efficiently rolled up into a searchable national database to be made available on the NTIA's web site no later than February 2011?*

NTIA should allow states to prepare GIS broadband mapping in any system or format of their choice, but the submission of that mapping to NTIA should employ open, non-proprietary standards. We recommend the use of OGC web mapping standards (see: http://www.opengeospatial.org) , particularly KML for publishing of broadband mapping online to the public, as well as WMS, WFS, and WCS for hosted web services that allow GIS users to access the data directly. The use of OGS web services by states would allow the NTIA to assemble a "virtual roll-up" map by connecting to live web mapping services simultaneously.

KML is highly desirable for publishing the broadband map layers to the general public. NTIA could host a web map with these layers combined with other relevant layers, using any of the popular web maps such as Google Maps or MS Virtual Earth. The KML layers could also be published separately so that anyone can incorporate them into other web mapping sites or embed them in GIS applications.

h. *Should other conditions attach to statewide inventory grants?*

It is important that the state mapping efforts be sustainable. Broadband infrastructure is changing rapidly, and will change even more rapidly as a result of the ARRA grants. If the broadband mapping is not actively maintained by the states to reflect ongoing changes, it will soon be worthless. NTIA should consider business plans from states that show how the state will continue to maintain the maps at least until the conclusion of the performance period for any ARRA broadband grant awards.

i. *What information, other than statewide inventory information, should populate the comprehensive nationwide map?*

We envision other, readily available GIS layers can and should be included in the nationwide broadband inventory map. Use of restriction-free and license-free data should be the preference. Some data, such as business data from Claritas or Dunn & Bradstreet, will need to be licensed. The NTIA focus should be on the creation, at the state level, of sufficiently detailed broadband GIS layers that can be combined to create a nationwide broadband inventory.

We appreciate the opportunity to submit our comments on this important matter.

Cordially,

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