Application for Federal Assistance SF-424	Version 02

* 1. Type of Submission:
☐ Preapplication
☒ Application
☐ Changed/Corrected Application

* 2. Type of Application:
☒ New
☐ Continuation
☐ Revision

* If Revision, select appropriate letter(s):

* Other (Specify)

* 3. Date Received:
08/14/2009

4. Applicant Identifier:

5a. Federal Entity Identifier:

* 5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: Office of the Governor, State of Mississippi

* b. Employer/Taxpayer Identification Number (EIN/TIN):
646000766

* c. Organizational DUNS:
019202949

d. Address:

* Street1: 550 High Street, Walter Sillers Building Suite 19
Street2:
* City: Jackson
County:
* State: MS: Mississippi
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 39201

e. Organizational Unit:

Department Name:

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:
* First Name: Serena
Middle Name:
* Last Name: Clark
Suffix:

Title: Chief Policy Analyst

Organizational Affiliation:

* Telephone Number: 601.576.2013
Fax Number:

* Email: sclark@governor.state.ms.us

OMB Number: 4040-0004
Expiration Date: 01/31/2009

Application for Federal Assistance SF-424	Version 02

9. Type of Applicant 1: Select Applicant Type:

A: State Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

* 10. Name of Federal Agency:

Department of Commerce

11. Catalog of Federal Domestic Assistance Number:

CFDA Title:

* 12. Funding Opportunity Number:

0660-ZA29

* Title:

Recovery Act - State Broadband Data and Development Grant Program

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

* 15. Descriptive Title of Applicant's Project:

Statewide Mapping Effort of Broadband Availability

Attach supporting documents as specified in agency instructions.

Add Attachments   Delete Attachments   View Attachments

OMB Number: 4040-0004
Expiration Date: 01/31/2009

Application for Federal Assistance SF-424	Version 02

16. Congressional Districts Of:

* a. Applicant `MS-002`   * b. Program/Project `MS-all`

Attach an additional list of Program/Project Congressional Districts if needed.

[   ] Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: `07/02/2009`   * b. End Date: `07/02/2014`

18. Estimated Funding ($):

* a. Federal	2,392,465.00
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	623,000.00
* f. Program Income	0.00
* g. TOTAL	3,015,465.00

* 19. Is Application Subject to Review By State Under Executive Order 12372 Process?

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on [   ].

☒ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☐ c. Program is not covered by E.O. 12372.

* 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes", provide explanation.)

☐ Yes ☒ No   Explanation

21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: [   ]   * First Name: `Serena`

Middle Name: [   ]

* Last Name: `Clark`

Suffix: [   ]

* Title: `Chief Policy Analyst`

* Telephone Number: `601.576.2013`   Fax Number: [   ]

* Email: `sclark@governor.state.ms.us`

* Signature of Authorized Representative: `Serena Clark`   * Date Signed: `08/14/2009`

Authorized for Local Reproduction

Standard Form 424 (Revised 10/2005)
Prescribed by OMB Circular A-102

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* Applicant Federal Debt Delinquency Explanation

The following field should contain an explanation if the Applicant organization is delinquent on any Federal Debt. Maximum number of characters that can be entered is 4,000. Try and avoid extra spaces and carriage returns to maximize the availability of space.

Project Abstract

Upon award of the NTIA grant, the Mississippi Team will immediately begin implementation of its broadband mapping plan to create a comprehensive and continually-updated map of broadband availability and use in the state of Mississippi. This process will begin by taking inventory of the current broadband service providers within the state. Concurrent with the inventory process, the OG and One Economy will assemble a small group of Subject Matter Experts (SMEs) across all technical domains: GIS & data mapping, broadband, data inventory, systems architecture, and data security. The SME group will work with the Office of the Governor (OG), One Economy, and the service providers to survey, analyze, properly safeguard, verify, and determine long-term solutions for housing the existing broadband data pursuant with the NOFA and NTIA grant guidelines.

Subsequently, the Data Gathering task will commence. One Economy will request the cooperation of the service providers, utilizing NDAs as appropriate, and establishing working relationships with each provider. During this phase, the GIS experts and systems engineers will review the requirements for data automation, processing and management. This includes automated processing of the related metadata for each data set. At this time, system hardware and software licenses necessary to support the project will be acquired, installed, and configured. One Economy will create a "Substantially Complete" data set by collecting and automating data from the broadband service providers; preparing other GIS data to support the processing of the broadband data; and the mapping of Community Anchor Institutions. As broadband data inventory is processed, analysis delineating unserved/underserved areas will be performed.

Quality Control processes will be employed to ensure maximum accuracy of processing and data ingestion into the GIS inventory by building in steps to verify the accuracy of the data provided by the Service Providers, especially as it relates to actual performance of their services vs. advertised capacities. This will be delivered to NTIA as identified in the NOFA. Non-proprietary and non-confidential data will be transferred to a public access server and incorporated into web-based map viewers to create the "Mississippi Broadband Portal" for public access and analysis. The data updates and maintenance phases will begin as soon as the baseline broadband data inventory is built. To address long-term data currency and accuracy issues, the baseline data will be updated periodically.

A web-based data access tool will be provided so that data providers may evaluate and sample their serviceability data and to ensure that their data are accurate and up-to-date. The initial and immediate priority will be to map all available carrier data and other serviceability data. A second phase of data collection can supplement and verify this data with survey data collected directly from consumers online by "crowd-sourcing" data from automated "speed tests," as well as from surveys of small businesses and residential and community anchor broadband users, which will be used to collect richer profiles of actual users' experiences and preferences.

The sustainability phase will commence after the first year of production and will continue beyond the Grant completion. One Economy will develop the necessary documents to provide training over the course of project implementation to OG so that the One Economy's work can continue at a high level of functionality beyond the Grant's completion.

The State of Mississippi

Broadband Data Grant

&

Program Narrative

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Introduction

Executive Summary

Under the administrative oversight of the Mississippi Office of the Governor (OG) as the main applicant, the OG has assembled a multi-disciplinary and cross-domain task force of local and national experts to lead the implementation of the State Broadband Data and Development Program (the Program) which includes the Mississippi Public Utilities Staff (MPUS), the Mississippi Development Authority (MDA) and the Mississippi Department of Information Technology Services (ITS). Through a competitive bid process, the OG selected One Economy (One Economy) as the primary vendor for this initiative.

Objectives:

- Gather and map comprehensive, statewide detailed broadband data;

- Create a composite GIS inventory,

- Provide data to the NTIA for nation-wide broadband mapping;

- Identify unserved/underserved;

- Provide means for aggregate reporting and public access, considering confidentiality of the service provider data;

- Identify gaps in Emergency Service and Community Anchor's access;

- Investigate constraints impeding wider coverage;

Recognizing the Grant's requirements, the objectives of the effort are to gather comprehensive, statewide broadband data on a detailed and disaggregated basis (address level), process and map the information into a GIS system, inventory the data, and provide means to aggregate the result for a comprehensive broadband map for the State of Mississippi. The effort further involves developing continual means to keep the information updated, providing effective public access to the data, and supporting data services and reports to the National Telecommunications and Information Administration (NTIA) where the data can be used to form a comprehensive nation-wide broadband mapping platform. In this effort, the task force has provisioned resources and solutions to ensure the security of sensitive data by using data-guard solutions, and providing for automated data access, maintenance, and update.

However, beyond the stated objectives, the State of Mississippi recognizes the importance of the effort in promotion of business opportunities, public access applications for education, health, and commerce, and extending the reach of remote communities to a wider range of services. As such, other notable objectives of the Program include activities that would guide identification of gaps and constraints that are preventing wider coverage, programs to assist in determining tactical and short-term solutions to close the gaps, and efforts to form the basis for evidenced-based and data-driven strategic planning and investments in the state's infrastructure and/or

policies aimed at promoting broadband coverage and related services. These objectives include (but are not limited to):

- identifying unserved/underserved areas: it must be noted that the State of Mississippi currently does not have accurate information regarding unserved or underserved communities. Therefore, one of the main objectives (and early targets) of the Program is to determine these areas using dasymetric (sub-census) population maps;

- identify possible gaps in Emergency Services' and Community Anchor's access to broadband, especially as it pertains to reaching wide and sparse populations;

- investigate constraints (policies, cost, investment gaps, etc.) impeding wider coverage; and

- evaluate the research and development infrastructure needs for Mississippi's universities, colleges and businesses to compete in the new global economy

Detailed resource planning was done using the project planning process, considering work breakdown structure, identifying technical resources and equipment required to complete the tasks, and analyzing the optimal number of parallel tasks that can be employed to meet the deliverable timelines. In order to ensure effective and efficient delivery of the data required by NTIA according to the stated timelines, about 80% of the resources were allocated within the first year of the project (with about 60% allocated within the first 3 quarters). Therefore, One Economy's full capabilities are utilized to meet the expedited timelines required by the grant. Yearly resources allocation estimates are depicted in Figure 1. Detail schedules and budget are provided in the subsequent sections.

Given this resource allocation, One Economy will be able to meet the requirements for the initial delivery of "Substantially Completed Data Sets" on November 1, 2009, followed by a more thorough broadband serviceability on or before February 1, 2010, and the "Complete Data Set by March 1, 2010. The State of Mississippi intends to use the data provided in the initial delivery to craft an application in Round 2 for infrastructure dollars. Additionally, One Economy expects to produce preliminary analyses for unserved/underserved areas, dasymetric (sub-census) analysis of the areas, and Emergency Services' and Community Anchor's access to broadband analysis in January, April, and June 2010, respectively.

Following the initial efforts, resource allocation is then balanced throughout the project to address incremental service offerings, public application access and web-based interfaces, and data updatability issues. Lastly, a slight increase of resources is provisioned toward the last 3 quarters in order to account for sustained transition of the processes and the platform.

Qualifications and Approach to Meet the Requirements

The implementation team represents a balanced public-private partnership composed of distinguished individuals, State Resources, and private industry experts and organizations with vast capabilities in broadband and telecommunications technologies, Geographic Information Systems (GIS) and data mapping, information systems engineering and implementation, and web-based software and enterprise data management applications. The OG and ITS also have existing relationships with, and access to, a wide range of collaborating State agencies, and holds or has access to a considerable inventory of detailed state-wide data necessary to accomplish the tasks.

The One Economy has vast surge capacities in GIS, broadband, data processing and automation, systems engineering, and secure public access application and data services to address all Grant requirements within the stated timelines.

In order to assure quality and comprehensive treatment of all tasks, including those involving cross-domain expertise required for the implementation, the OG has assembled a small group of Subject Matter Experts (SMEs) across the major technical areas to advise OG on and work with the data providers regarding specific technical issues. The SMEs include representatives from the OG, ITS, One Economy and other necessary Mississippi governmental agencies. Initially, SMEs will customize data surveys according to the providers' inventories, will help with the data mapping, and will provide an overall gap analysis of the existing data and resources and the Program objectives. During the course of the project, the SMEs will architect solutions, will provide on-going reviews of the progress, and will advise on technical implementation tasks.

To ensure timely **_Data Gathering_**, OG will be making introductions to the service providers on behalf of the State Program immediately after the grant signing. SMEs, in turn, will work with the providers on data gathering arrangements and regarding any issues involving broadband-specific data mapping and data (content and format) compliance.

Equally as important, ITS and One Economy have an extensive inventory of and/or have secured access to detailed data sets relevant to the Program. And finally, OG and ITS have substantial existing relationships and **_collaboration_** with many State agencies and county collaborators, such as the Mississippi Development Authority, Community and Junior Colleges and Institutions of Higher Learning, Mississippi Coordinating Council of Remote Sensing and GIS, Mississippi Public Utilities Staff, and Mississippi's Regional Planning and Development Districts, who can assist the Data Gathering Process.

To ensure information **_Accuracy and Verification_**, The SME group will review "sample representative" data from each provider, and then continually will review the collected data to assure compliance and completeness. Wherever applicable, One Economy will also employ broadband technology-specific algorithms to uncover possible discrepancies, such as comparing aggregated data with the inter-connect network capacities. Finally, where possible, spot-checks will be performed manually.

Regarding data *Accessibility*, One Economy has a variety of existing web-accessible, public facing, easy-to-use and operate, GIS Internet applications which allow users to find, visualize and fuse a variety of layered information for viewing or printing purposes. Furthermore, One Economy has extensive experience in providing a variety of standard web-based "feature" and "map" services that enable easy access and consumption of data by other open-source or user-custom GIS applications. Finally, One Economy is already operating a large network of "meta-data" search and discovery services, data and meta-data automated ingest and production functions, and rapid but quality controlled (secured) data publication capabilities. All of these experiences will be used for supporting a variety of access, publishing, and data discovery methods.

To address data *Security and Confidentiality*, One Economy will be using the security, access-control, authentication, and authorization services built into many of the applications described above. Additionally, if desired, One Economy has the capabilities to utilize data guards similar to what currently is in use by various US Government agencies to protect their classified information, thus minimizing any concerns data providers may have over unauthorized access to company confidential information.

Wide spectrum of *Applicant Capabilities* as well as *Capacity, Knowledge, and Experience* are best demonstrated by (the public-private partnership composure of) One Economy's collective capabilities, depth of technical, capacities, and reach. One Economy offers an extensive cross-domain expertise and experience in related technologies and processes, as well as a wide range of affiliated collaborators, existing applications, and relevant inventory of detailed data sets to address all Program requirements.

Expedient Data Delivery requirements are addressed by One Economy's capacities, knowledge, and experience in data collection, automated processing, and existing applications and methods for data publications which are actively being used to support a number of critical services. The same experiences will be used to offer optimal data delivery options for this Program.

Similarly, One Economy's expertise in engineering systems and networks for automated data processing, its experience involving broadband data interfaces and modules, and its distributed data network architecture, all offer optimal solutions to address *Repeated Data Updating*.

The Team, Expertise, and Roles

The OG, as the main applicant, will also provide administrative oversight and will lead the implementation of the Program. To accomplish this, the OG has assembled a multi-disciplinary and cross-domain team of local and national experts to lead this implementation which includes the MDA, MPUS and the ITS. Through a competitive bid process, the OG selected One Economy as the primary vendor for this initiative.

Although the implementation of the Program will be led by the OG, expertise in GIS, data mapping and processing, and public applications access will be provided by One Economy. One

Economy has proven and extensive capabilities in data management and GIS, and operates a vast inventory of baseline data, such as sub-census population data, parcel-level tax maps, community anchor institution, and other data sets critical to the success of the effort. One Economy also has expertise in handling large volumes of data, managing sensitive information access, and administering a wide range of web-based GIS solutions for public access to baseline and near-real-time information for user-generated product automation.

The Mississippi Geospatial Clearinghouse (MGC) was placed in production by ITS in September 2007 and serves as the state's premier portal for the GIS community to search, discover, share, and use a comprehensive warehouse of Mississippi's geospatial resources. Moreover, the MGC is the primary location for the Mississippi Digital Earth Model (MDEM). The seven framework layers comprising MDEM are the standard components of digital maps used by GIS communities throughout the world. The goal of the MGC is to make the application of spatial information technologies within the state of Mississippi more efficient by eliminating the duplication of spatial data production and distribution through cooperation, standardization, communication, and coordination.

State agencies, county government, city government and the public can download data that has been stored in the MGC. This data provides the foundation for applications to be developed using GIS technology to meet business needs of the governmental agencies and/or public interest. ITS continues to work with the Mississippi Coordinating Council for Remote Sensing and GIS in the enhancement of the MGC and in the maintenance of GIS hardware and software procurement instruments for state agencies and local governing authorities

Broadband specific domain expertise will be supplied by One Economy and their national coalition. One Economy's team has extensive experience in digital mapping and Broadband Serviceability. They have over 150+ person-years of experience in the digital mapping business working for market leaders including Etak, GDT and TeleAtlas prior to joining this effort. Their capabilities are far reaching in the GIS space with expertise in geo-coding, GIS tools, mapping, spatial and relational databases and quality control. One Economy has extensive experience in the development of State Mapping solutions. One Economy's team was the first to launch a national Broadband Serviceability engine in 2000 that aggregated together all of the major Broadband carriers into a single, web-based engine that was utilized by major retailers including Circuit City and CompUSA. This serviceability data included critical attribution such as availability, type of service, and speed of connection, pricing, and promotional data.

One Economy's Leadership team has held Executive positions at global digital mapping companies, global telecommunications carriers and multi-national consumer electronics firms, and offers end-to-end expertise in broadband planning at a large scale, and has access to a variety of national, interstate, and intrastate broadband data that are important to the Program.

Together, the above team of OG, ITS, ,MDA, MPUS and One Economy offer vast capacities in GIS, broadband domain expertise, data processing and automation, systems engineering, and secure (but open) public access application and data services expertise thereby ensuring implementation of a comprehensive solution that meets or exceeds the grant requirements within the stated timelines.

Implementation Process Overview

One Economy will rapidly begin gathering an inventory of wired/wireless broadband service providers within the state. Additionally, OG will start communicating the purpose of the Program and its requirements to the major service providers to secure their collaboration during the implementation phase.

Shortly after the Grant signing, OG and One Economy will assemble a small group of Subject Matter Experts (SMEs) across the major technical domains: GIS & data mapping, broadband, data inventory, systems architecture, and data guards. The SME group will work with OG and One Economy and the service providers to, among other tasks:

- Customize the surveys listed in Technical Appendix A of the Grant application according to the provider, and as necessary, ensure full compliance in data requests;

- Assist in the matching or "mapping" of the requested data elements to the data elements contained within the service provider's inventory;

- Assess the optimal process of obtaining the data, including any possible opportunities for automation of data mapping and inventory ingest processes;

- Assess the volume of the initial data, as well as long-term updates, and start revising the detailed system and network architectures;

- Review and assess existing data inventories available to ITS and One Economy, including baseline statewide data, their accuracy, and any licensing/ownership rights for continual update;

- Assess data sensitivity and access requirements for proper data guard solutions; and

- Revise and customize information assurance and quality control processes to ensure fully meeting Grant requirements for submittal of the data to NTIA.

A gap analysis will then be performed in consideration of the grant requirements, available data and resources, and the time constrains for the deliverables. Necessary adjustments to the execution plan will be considered to ensure optimal balancing of the tasks and resources against the requirements and the deliverables to NTIA.

Next, the *Data Gathering task* will commence, with One Economy making requests to the service providers and *establishing working relationships* with each provider.

During this phase, One Economy will also review the requirements for data automation, processing and management. This will also include automated processing of the related

metadata for each data set. System hardware and software licenses necessary to support the project will be acquired, installed, and configured at this time.

As the relationships with the Service Providers are solidified and the base data processing and management components are put in place, data collection steps will start in earnest. This will include *collecting and automating data* from the Broadband Service Providers, and *preparing other GIS data* to support both the processing of the broadband data as well as mapping the *Community Anchor Intuitions*. Next, the *data processing and analysis* will start by utilizing a combination of manual and automated processing of the collected data and the related metadata towards preparation of a "Substantially Complete" data set. As broadband data inventory is processed, analysis regarding unserved/underserved areas will be performed.

Quality Control (QC) processes will be employed to ensure maximum accuracy of processing and data ingest into the GIS inventory. All data records will be geo-coded, as necessary, at this stage.

Built into the processes above will be steps to *verify the accuracy* of the data provided by the Service Providers and/or computed by processing steps (above), especially as it relates to actual performance of their services vs. advertised capacities.

Following the processing and validation steps, data sets will be delivered to NTIA as identified in Appendix A. Additionally, non-proprietary and non-confidential data will be transferred to a public access server and incorporated into web-based map viewers to create the "Mississippi Broadband Portal" for public access and analysis.

The *data updates and maintenance phase* will start initially as soon as data inventory is built, but will increase as the platform ages. To address the long-term data updatability and accuracy issues, several approaches will be taken, depending on the nature of the data sets.

For baseline data, the information exchange GIS services as well as the web-based applications existing processes for periodic updates will be leveraged. Additionally, and as appropriate, One Economy will take maximum advantage of data services from the original sources (such as obtaining the transportation network from commercial mapping partners, including Navteq, DOT, demographic data from US Census, and base imagery from Yahoo!, Bing, or Google, etc.)

For the broadband data sets, to the maximum extent possible and according to predetermined specifications, One Economy will work to establish bi-lateral data exchange agreements between ITS, as the facilitator of state-owned data and the appropriate state entity. The data specifications will then be used to periodically automate processing and ingest of data and metadata. The processing will also include error report generations that can be used to identify inaccurate or incomplete data sets.

A web-based data access tool will be provided so that data providers may evaluate and sample their serviceability data and to ensure that their data are accurate and up-to-date.

While mapping all available carrier data and other serviceability data will be the initial and immediate priority, a second phase of data collection can cost-effectively supplement and verify this data with survey data collected directly from consumers. The collection and layering on of consumer experience data can be done in two basic ways: first, and most cost-effective, it can be done in volume online by "crowd-sourcing" data from automated 'speed tests' that individual users can run and receive immediate feedback for their own use as an incentive. Virtual outreach efforts can encourage tens of thousands of users to 'take the test,' receive a 'report card,' and as a byproduct add to the automated aggregation of consumer experience data. Second, resources permitting, surveys of small businesses and residential and community anchor tenant broadband users can collect richer profiles of actual user experience and preferences.

Sustainability phase will commence after the first year of production and will continue beyond the grant completion. During this phase, One Economy will develop the necessary documents describing the processes, data processing, technical specifications of applications, system architecture, system maintenance, and the like. These documents will be used to provide training over the course of the project implementation to OG and ITS.

The Collaboration phase will require a group effort from all involved state agencies and private partnerships with participation from all stakeholders. The Program Management team from OG and One Economy will deploy a traditional approach to project planning and collaboration. Five components will be followed in this Broadband Mapping project planning: a) Project Initiation Stage; b) Project Planning Stage; c) Project Execution Stage; d) Project Monitoring and Controlling Systems; and e) Project Completion Stage.

The Planning Phase requires a well-designed and well-executed broadband adoption programs for Mississippi to make significant progress in realizing the economic, educational, and personal benefits of universal broadband adoption by all segments of the population. The planning program will have an emphasis on the following goals: (a) developing a baseline assessment on Broadband deployment; (b) identifying and tracking areas of low Broadband penetration and identifying suppliers who could assist the team in increasing adoption; (c) identifying barriers of adoption for Broadband; (d) creating regional and local Digital Connector programs to manage One Economy's planning efforts; (e) establishing Internet and computer ownership programs; (f) collecting Broadband market data to incorporate into our core Broadband mapping database; (g) facilitating exchange of information between private and public sector partners and (h) creating tools to be able to automatically input data into the core Broadband Map.

Technical Narrative and Approach

Data Gathering, Verification, Processing, Access, and Security

OG and One Economy are committed to implementing systems, processes and applications which will efficiently and repeatedly produce the requested data for NTIA. The narrative that

follows illustrates One Economy's experienced-based approach to satisfy the requirements as outlined in the NOFA.

Data Gathering

Data gathering involves an interrelated series of steps, or *tasks*, which collectively result in preparation of a comprehensive and high-quality datasets required by NTIA, meeting the four major areas outlined in Appendix A of the solicitation, including:

1. Broadband Service Availability in Provider's Service Area, for each Provider
    a. Service availability by Census Block
    b. GIS-based (for wireless service)
2. Residential Broadband Service Pricing in Provider's Service Area, for each Provider
3. Broadband Service Infrastructure, for each Provider
    a. Middle mile and backbone interconnection points
4. Community Anchor Institutions

Each of the *data gathering tasks*, detailed below, are organized to support both the expedient initial delivery and the semi-annual updates required by NTIA, as well as to support efficient public access to service area maps. The tasks also consider security and confidentiality for data access as described in the *Accessibility* and *Security and Confidentiality* sections, respectively. These tasks include establishing a working relationship with Mississippi's Broadband Service Providers, establishing the data processing and management environment, collecting and automating data from the Service Providers, preparing other GIS data, and processing these data to a unified schema in order to support necessary updates and reports for NTIA and the public.

Establishing a Working Relationship with Mississippi's Broadband Service Providers
Even before this grant application has been approved, OG will begin dialogs with key broadband providers in Mississippi in an effort to help them understand this program, our approach, our information needs, and the opportunities and associated benefits of a successful program. In anticipation of a favorable review by NTIA, One Economy will continue engaging with these organizations to expedite timely, accurate and comprehensive data collection from each of them. These steps will also help to accelerate and optimize the deployment of the data processing environment and the development of an appropriate data model. The first two tasks will be initiated following contract award (described later).

Establishing the Data Processing and Managing Environment
To support the eventual processing and management of the data collected under this activity, appropriate system hardware and software licenses will be acquired, installed, and configured. The hardware platform will be sized to assure sufficient storage and optimal performance given the volume of data and usage, as well as maximizing up-time. The software applications include a host of enterprise and scalable solutions, such as Oracle or other similar Relational Databases

extendible for GIS, ESRI server products (e.g., ArcGIS, ArcIMS, ArcCatalog for metadata, etc.), and a variety of other (mostly open-source) Internet and Application Server (stock) products.

The system and the platform will be housed and hosted by One Economy, leveraging existing capabilities, for the period of performance (up to 5 years), and then will be transferred to OG (or designated Agency), as described in the sustainability section.

Initially, a fully configured GIS system will be deployed, and associated data models will be implemented to provide the baseline inventory system for the collected data. Incrementally, other services will be built on the system to address:

- data and metadata automation processing that may require systems engineering and software development;

- definition and implementation of GIS data services (and data standards), based on standard industry services (e.g., WFS, WMS, KML, XML, etc.), required for data exchange and information sharing and distribution; and

- automated broadband data update processes and ingest (as feasible).

Over time, and as standard services are defined and deployed, the One Economy will develop, deploy, and release the following services:

- automated applications and/or processes employed by OG (or designated State Agency) that would generate reports required by NTIA and according to the specifications provided in the Grant Solicitation Appendix A, from the GIS inventory;

- web-based standard OGC-compliant metadata search, discovery, and download (as applicable according to licensing agreements and confidentiality governing the data);

- web-accessible standard data exchange services, such as WFS, WMS, KML, XLM, etc. (constrained by the licensing agreements and confidentiality governing particular); and

- web-based accessible, password-protected as well as open access GIS viewer application(s) to allow public user access and product generation. The application will include printing capabilities of generated products; place-name gazetteers and address lookup search, thereby allowing for fusion of other baseline GIS data sets.

As noted, some of the components and processes are already in place within One Economy's data processing facility and can be used without any modifications. These include significant hardware, GIS software, applications, and data as well as other network and Internet servers and services. Other components – equipment and processes – will be acquired and developed under this grant to specifically receive, process, safeguard, and deliver required datasets to NTIA and to the public.

Collecting and Automating Data from Broadband Service Providers
This task will begin immediately upon award notification with One Economy making requests to the service providers for subscriber, service area and infrastructure data. One Economy

will utilize a representative sample of these data to develop a data model to efficiently store data from each provider and create a database schema accordingly.

It is anticipated that each Service Provider will provide the requested information in different formats and schemas. One Economy will not attempt to harmonize all sources into a single unified data model/schema at this point, but will perform some pre-processing to standardize storage of common elements across all provider schemas (e.g., names, addresses, etc.). The resulting data tables can be considered a "staging area" designed to both effectively accommodate future inputs (i.e., updates) and outputs (further described below).

To populate the Staging Area database, automated scripts will be developed to Extract, Transform and Load (ETL) data from each provider into appropriate database tables. Depending upon available data transfer mechanisms and anticipated data update procedures a unique script/process is likely required for each data type (1 – 3 above) from each service provider. These ETL processes will be automated based on Data Processing and Publishing (DPP) service extracts, key parameters from the original source documents / data services, and will transform them into geospatially-referenced data sets, and load the resulting records into One Economy's Geospatial Database (GDb). Metadata (information which describes the underlying data) is also captured and/or updated at this point in the processing sequence. DPP is designed to process dynamic data from a wide range of data types from multiple sources using a diverse set of protocols and methods.

In addition to automated parsing using DPP, One Economy will aggressively work with every small to mid-tier provider to integrate open Application Programming Interfaces (API) into their billing and/or serviceability engine. Specifically, One Economy has extensive experience undertaking similar integration efforts using its messaging platform (depicted in Figure 4). There will be some cases where carriers do not have the core expertise or infrastructure to build these interfaces. In those cases, the One Economy will determine whether integration of open APIs is feasible, and if not, will provide additional options based upon their situation. These options include:

- Secured FTP site – Allows carriers to send their data to One Economy in a standardized format

- Email Interface – For carriers that are less sophisticated, One Economy has a conflation tool that converts various file formats and integrates the data into a pre-production engine; and

- Fax Interface – To serve the lowest common denominator.

One Economy and its partners have used the above options in projects involving major broadband service providers, and have negotiated national agreements to provide serviceability data collected using these options to consumers through protective terminals and online. This experience includes the development of integrated tools to provide for dynamic display of serviceability data including attributes such as speed (upload and download), price, plan detail, promotions and bundled offerings. Their efforts produced the first ever nationwide assemblage of carrier serviceability. This experience will be used to gather serviceability information from these core providers. Whether the ETL scripts or any combination of the above options 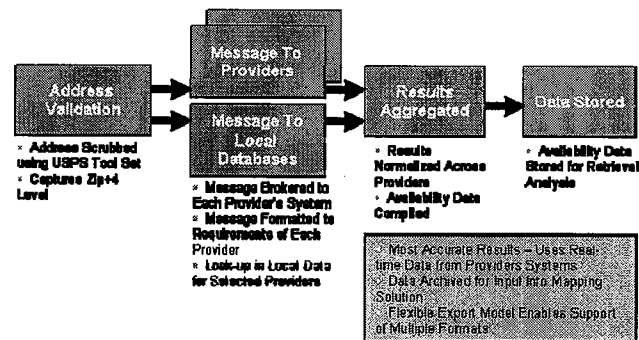are used, One Economy follows a formal testing process that includes establishment of test case scenarios and documentation of all required inputs and anticipated outputs.

Figure 2 - Overview of the messaging platform

In other words, the testing step will ensure that the data contained within the Staging Area database are consistent with what was originally obtained from each Provider, i.e., that the ETL process did not introduce errors. Additionally, as the data is compiled from each service provider it will be verified for consistency and completeness (i.e., One Economy will review the data to assure that they are correct representations of the service that is actually provided). This second mode of verification/validation will include utilizing broadband technology-specific algorithms to uncover possible discrepancies, such as comparing aggregated data with the inter-connect network capacities. Spot-checks will be performed manually as well. At the conclusion of this task, One Economy will have:

- established data sharing relationships with all key Broadband Service Providers;
- implemented mechanisms to automate receipt of necessary service area, service pricing and infrastructure data; and
- populated a Staging Area database with an initial snapshot of data sufficient to address the NTIA requirements for items 1 - 3 as outlined in Appendix A.

Preparing other GIS Data

Data Gathering also involves collection and processing of additional GIS "framework" and community anchor institution data to fulfill the NTIA requirements (i.e., item 4 in Appendix A).

These data are also needed to effectively fulfill the public-accessibility / State Map requirement. Presently, One Economy holds a significant number of these necessary datasets, many of which have been provided by strategic partners. The table below highlights key framework and anchor institution data, their source and main attributes:

GIS Framework Layers*		
Name	**Source(s)**	**Key Features / Characteristics**
Demography	US Census, Navteq	Cities, Place Names, Populated Places, CensusSF1 and SF3, Population Density
Transportation	MDOT, ITS and Mississippi Geospatial Clearinghouse (MGC)	Airports, Seaports, Heliports, Roads, Bridges
Hydrography	USGS, NHD, ITS	Streams, Wetlands, Dams, Rivers, Reservoirs
Cadastral	MDOT, ITS, MGC	Land Parcels
Business Loc	InfoUSA	Hotels, Financial Institutions, Ice Production Facilities, Fuel Supply
Boundaries	Navteq	Coastlines, ZIP codes, Census Tracts and Blocks
Land Use	ITS, USGS, Sect'y of State	Landcover, Landuse, Fed Lands, Parks, Reserves, Zoning
Terrain	USGS	Digital Elevation Model (DEM), contours, Radar-derived DEM (IfSAR), shaded relief, LIDAR, topographic maps (DRG's)
Imagery	USG, Digital Globe, ITS	Satellite (Landsat, SPOT, IKONS, QuickBird), air photos
Community Anchor Institution Layers		
Emergency Services	MEMA, Navteq, Department of Health, MGC	Police & Fire Stations, Fire Response Zones, Emergency Shelters, Emergency Operations Centers, Siren Locations
Health Care Svc	InfoUSA, Schools, Health and Libraries Coalition	Hospitals, Health Clinics, Assisted Living, Skilled Nursing Fac
Public Facilities	InfoUSA	Public schools, Government buildings
Other	InfoUSA	Cemeteries, Places of Worship, Corrections Institutions

Table 1 – Sample of Existing Data Inventory

These datasets will be processed and quality controlled for high accuracy according to One Economy's "Best Practices" procedures. Key components of this process include establishment of defined staff roles and responsibilities including: (i) Processing Manager, responsible for prioritizing, scheduling, resourcing and tracking data automation processing; (ii) Geospatial Data Manager, responsible for overall data content and quality for GDb resources; (iii) Metadata Manager, responsible for ensuring quality and integrity of metadata describing the contents within GDb; and (iv) Analysts, who create (and utilize) data according the diagram below.

Each is assigned specific database roles and permissions commensurate with their duties. Other components of the GDb processes described in the Practices document include acquisition planning, processing, validation, metadata authoring, data and metadata loading, and symbology file creation. A versioned geospatial database is used to support multi-user editing and review of new/revised data prior to them being committed to a production service.

Data Processing and Analysis

The next step in the Data Gathering process involves additional processing of data within the Staging Area and GDb to populate the Broadband Production Database. In a sense, this moves, transforms and conditions all necessary data from assorted data providers, including Broadband Service Providers, into a unified and controlled data environment. It also captures data processing steps and other information required to update metadata. These steps will be automated to the extent possible, especially for re-occurring steps such "mapping" provider data to the data model developed by One Economy during the previous step. Other data loading, populating community anchor institution tables from One Economy's GDb, for example, may be done manually as updates are not expected to be frequent or regular.

Initially, during this phase, the greatest emphasis will be placed on:

- Meeting the broadband mapping requirements for the "Substantially Complete" data set. All possible capacities at the disposal of One Economy will be utilized here to ensure the most realistic delivery of the data sets for the Grant's deliverable timelines; and

- Aggregation of the broadband data to determine the State's "unserved" and "underserved" areas. These data sets are not currently available with sufficient accuracy.

Priority will also be given to an initial analysis of the information above in correlation to the identification of possible unserved/underserved vulnerable or disadvantage population and emergency services. Among other benefits, this will help identify important "hot spots" for the broadband planning process.

Data Processing and Analysis tasks will include a combination of automated and manual (or manually assisted) steps to harmonize and insure quality and integrity of data required to address all items in Appendix A. These steps will include combinations of:

> Priority processing will be given to "*Substantially Complete*" data set.
>
> Priority Analysis will be given to the State's "*unserved/*"*underserved*"

- **geo-coding** - providing address-based records with spatial coordinates;

- **reverse geo-coding** - assigning an address to data containing geospatial coordinates;

- **conflation** - combining and aggregating different sources of information for the same feature – e.g., two street maps – to provide a single representation of the feature by using

the best available information from all sources – e.g. street geometry from one source and address ranges from another source;

- **feature editing/clean-up** - manual editing to resolve errors or discrepancies associated with automated processing steps – e.g., polygon "sliver" and "dangling nodes" removal to construct valid topology;

- **spatial overlay** - mathematically compositing information from two or more feature categories to into a single data source – e.g., assigning available broadband service levels from one GIS layer to addresses in a parcel database layer or combining individual wireless service area maps into a composite map;

- **spatial analysis** - implementing spatial algorithms to derive new/additional information – e.g., validating or estimating service availability by modeling wireless propagation over terrain or estimating wireline service boundary from infrastructure data layers.

Specifically, under this task, data will be processed and transferred from the Staging Area Database and from GDb into the Broadband Production Database such that:

- all addressed-based provider data (1a) are geocoded and loaded into the same geodatabase schema;
- all shape-based provider data (1b) are composited into the same geodata schema;
- all broadband service infrastructure data (3a, b) are reverse geo-coded (if/as necessary) and loaded into the same schema; and
- all community anchor institution data are geocoded (as necessary) and loaded into the same geodatabase schema. (As noted above, many of the required community anchor data are already available and geocoded.)

Quality Control (QC) and metadata preparation processes described above will be utilized in this phase as well to ensure consistently high-quality data standards.

One Economy has significant experiences and resources to accomplish these tasks. Highlights include:

Geocoding/Reverse Geocoding

One Economy has multiple means available for geocoding addresses within the State of Mississippi. The ESRI StreetMap which is a national dataset with 85 – 90 percent accuracy is often used as the starting point. Through the use of custom address locators, other datasets within One Economy's GDb which contain address range information can then be used to complete the geocoding process. These include national databases such as the National Transportation Atlas Database, NAVTEQ, and TIGER, as well as local data resources, such as county centerline datasets and parcel datasets.

Dasymetric Mapping - One Economy has refined and applied methods to disaggregate census data to estimate the distribution of population and socio-economic characteristics. In Mississippi the Census geography, even at the most detailed Census block level, varies significantly in

both area and population size. This deviation in the Census geography is especially important in rural areas where census units are large and population density is not homogeneous. Ancillary data sets, such as land use/land cover, can be used to more accurately distribute the population, and thus the demographic data associated with the population, to better identify segments of the population requiring specific services, be they emergency management services or broadband telecommunications services.

Spatial Modeling and Analysis

Spatial modeling and analysis techniques will be used to transform information provided by service providers into informative and easy-to-interpret coverage area maps as illustrated below for Biloxi and Gulfport, Mississippi by One Economy. The underlying spatial data used to create this map will in turn be used to populate the publicly-accessible Mississippi Broadband Portal and associated map services as well as combined with parcel and master address files to produce address-based broadband availability data required by NTIA.

Figure 3 - Spatial Modeling Sample
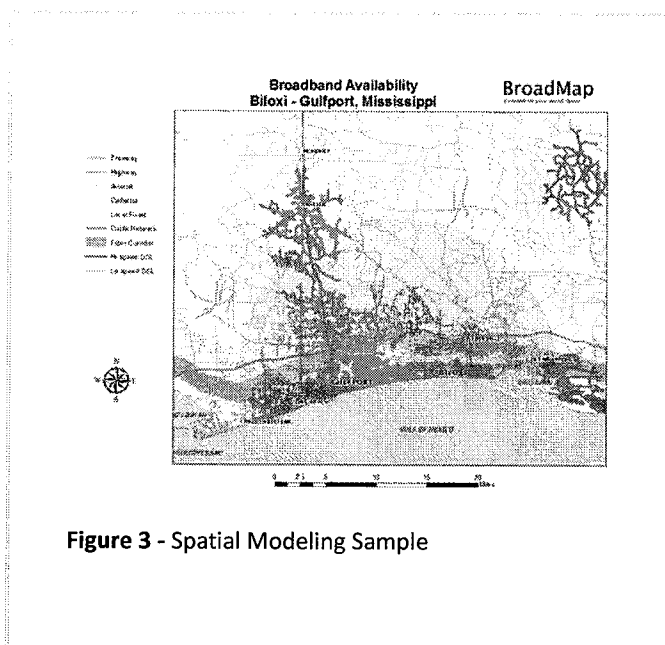
Accuracy and Verification

To ensure information *Accuracy and Verification*, One Economy will review "sample representative" data from each provider, and then will continually review the collected data to assure compliance and completeness. Wherever applicable, One Economy will also employ broadband technology-specific algorithms to uncover possible discrepancies, such as comparing aggregated data with the inter-connect network capacities. Finally, where possible, spot-checks will be performed manually. One Economy and our partners utilize multiple methods to determine data accuracy and validation. Below are the components that will formulate the method.

Data Comparison – One Economy's approach is to develop a dynamic and updateable map database based on the capability of multiple technologies that allow for conflation of data from multiple sources. With over 20 layers of data in the list above, the mapping solution is capable of being both a data accuracy tool as well as a data verification tool. The data platform evaluates all the data that is contained in the database and produces exception reports based upon the anomalies from the data. One Economy's digital mapping technicians evaluate all the exceptions produced by the platform and make determinations based upon data that is available to them. If

the digital map technician cannot make a thorough determination, they will refer the exception to Quality Control to do the following:

- Call Service Provider(s) in the specified area for verification;
- Dispatch Digital Connectors to visit the area and survey users;
- Contact state resource partners for further verification of data;
- Contact data partners to ask for verification; and/or
- Employ conference center partner to call businesses and consumers in the surrounding area to inquire about their Broadband service options.

Surveying: In order to validate provider information on coverage and to create a baseline for assessing broadband access demand, One Economy will initiate and manage several survey/sampling efforts in the State. First, One Economy will initiate a Preliminary Survey/Sampling effort to assess demand for and access to – both statewide (as baseline) and in unserved or underserved areas – broadband connectivity. This process is as follows:

- Create State-specific poll to ask consumers to identify their current broadband status:
  - connectivity offerings (if known)
  - pricing options (if known)
  - interest in broadband service
  - willingness to pay for broadband service
  - is Broadband a luxury, nice-to-have, or a needed service
  - where does the consumer access the Internet
  - are consumers properly trained and comfortable using the Internet
  - is Broadband content relevant to consumers

- Poll 300-1000 (statistically significant sample) in areas where anomalies exist statewide to establish baseline of consumer knowledge and statewide broadband availability.
- Poll 300-1000 rural citizens to quantify consumer knowledge and rural broadband availability as a baseline.

Additionally, One Economy will utilize Data Verification Specialists, who will be assigned to regions throughout Mississippi to establish relationships with carriers, to work with regional and municipal data providers and to spot check serviceability in areas where we find anomalies.

Provider Verification – One Economy's web-based data access tool provides the capability to Service Providers to evaluate and sample their serviceability data and to ensure accuracy.

Speed Testing - While mapping all available carrier data and other serviceability data will be an initial and immediate priority, a second phase of data collection can cost-effectively supplement and verify this data with survey data collected directly from consumers. Data on consumers' actual online user experience can serve a number of important policy objectives, including the verification of carrier-provided data (such as "advertised" speeds) and the identification of bottlenecks due to under-provisioning. Concerning the speeds (throughput) provisioned to the state's residences, businesses and community anchor institutions, the Commerce Department's NOFA requires not only the mapping of the "maximum advertised downstream (and upstream) speeds," but also the "typical downstream (and upstream) speeds" experienced in practice by consumers. While the accurate collection of actual consumer experience data requires