

District of Columbia Spring 2011
State Broadband Availability Data Collection and Verification Technical White Paper

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Organization Name: District of Columbia Office of Chief Technology Officer
Project Title: ARRA SBDD - District of Columbia OCTO
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Introduction

The National Telecommunications and Information Administration (NTIA), a division of the U.S. Department of Commerce, through the Broadband Data Improvement Act (BDIA), has sponsored the State Broadband Data and Development Grant Program. This Program is designed to fund projects that gather comprehensive and accurate state-level broadband mapping data, develop state-level broadband maps, aid in the development and maintenance of a national broadband map, and fund statewide initiatives for broadband planning.

The following white paper describes the data integration and verification processes employed by the District of Columbia in preparation of the Broadband Availability data set submitted to NTIA on April 1, 2011. This data collection is to be conducted on a semi-annual basis over a five-year period. The "Spring 2011 Technical White Paper" will be the third round of ten semi-annual submissions by the District of Columbia and attempts to reflect conditions in the field as of December 31, 2010 or later.

The paper is divided into seven sections:

Section 1 - Data Description: describes April 1, 2011 deliverables to NTIA;

Section 2 - Provider Participation: summarizes provider cooperation;

Section 3 - Data Collection: describes outreach and collection efforts;

Section 4 - DC geospatial data: describes the role of DC GIS data in broadband data processing;

Section 5 - Data integration and processing: describes data manipulation steps; and

Section 6 - Data validation: describes efforts to validate the data received.

Section 7 – Documentation and Submittal: Includes the NTIA final checklist steps.

SECTION 1 - DATA SUBMISSION DESCRIPTION

The District of Columbia's spring 2011 submission consists of the following files:

DC_SBDD_20110401.zip – Consolidates all other files for the purpose of data transfer.

DC_SBDD_2011_04_01.gdb – An ESRI file based geodatabase that conforms to the data model distributed by NTIA. It contains primary data and metadata. The District provides NTIA with five sets data:

- **Community Anchor Institutions** – The location of community serving institutions and information about their broadband connections – if known.
- **Middle Mile Connections** – The locations and attributes of infrastructure that interconnects broadband networks.
- **Wireless Broadband Availability** – The service territories and attributes of wireless broadband providers including terrestrial fixed wireless and satellite.
- **Wireline Broadband Availability** – The territories and attributes of wireline broadband providers by year 2000 Census Blocks.
- **Metadata** – Information about the data sets described above.

DC_DataPackage_2011_04_01.xls –A report on broadband providers contacted and the status of their submissions.

DC_2011_04_01.txt – An analysis of DC_SBDD_2011_04_01.gdb known as the “data submission receipt.” This file is created by an automated script supplied by NTIA.

DC_Methodology_2011_04_01.pdf – An electronic version of the following document.

DC_Readme_2011_04_01.txt – A reduced file with the same information found in the header and section 1 of this white paper.

SECTION 2 - PROVIDER PARTICIPATION

- The PSC initially identified and contacted perspective 146 broadband providers.
- Of those, 34 are believed to be providing broadband service in the District and are listed in DC_DataPackage_2011_04_01.xls.
- Of those provided 28 availability data (either wireline and or wireless).
- Six don't provide service in District within 10 days.
- Only 8 provided middle mile data.

SECTION 3 - DATA COLLECTION

Collection of Broadband Availability Data

The District of Columbia Office of the Chief Technology Officer (“OCTO”) was awarded a grant from NTIA to map the availability of broadband services in the District of Columbia (“District”). OCTO has delegated to the District of Columbia Public Service Commission (“PSC”) the responsibility for all interaction, including data collection, with the broadband service provider community.

Process Steps

1. Identifying and Contacting Broadband Providers

- The work of identifying providers is conducted by the PSC. The PSC reviewed its own records and those of the FCC. Firms identified as providers were:
 1. All firms in PSC records as providing any kind of telecommunications service in the District.
 2. All firms identified by the FCC as having filed a form 477 for broadband service in the District.
 3. Satellite providers were also contacted.
 4. The initial identification of providers took place prior to the spring 2010 data call and has been refined for each NTIA submission. The PSC reviewed the list of identified providers for fall 2010 and was able to weed out several firms that clearly were not in business within the District.

2. **Contacting providers** - The PSC requested the assistance and cooperation of all commercial broadband service providers that provide service to any residential, business, institutional, or government entity located within the District, to provide the PSC with broadband service location data. Beginning in fall 2010 and continued into spring 2011, providers were asked to submit information regarding technologies and services that they **resell** and were not limited to providing data only regarding **facility-based** services.

Whenever possible, providers are initially contacted by email. The package of material sent by the PSC to providers:

- **A letter from the Chairman of the District of Columbia Public Service Commission.** Sample letters can be found in **Appendix 1**. Providers receive one of following three letters:
 - A letter to companies that have never submitted mapping data.
 - A letter to companies who submitted mapping data in round two.
 - A letter to companies who submitted round three data before even being asked.

- **Non-Disclosure Agreement (NDA)** The PSC offers every provider opportunity to enter into a NDA between OCTO and the Provider. The standard OCTO NDA is shown in **Appendix 2**. The NDA explains how OCTO will handle the submitted data; including what portions of the data will be submitted to the NTIA and what derived products will become part of the public website on broadband services available within the District that is under construction by OCTO. Key provisions of the District's standard NDA include:
 - OCTO will give the data NTIA for the National Broadband Map.
 - The service territories of individual providers will not be made public by OCTO, but OCTO has created [a public web site](#) that allows users, including potential broadband service subscribers, to enter any valid address in the District of Columbia and be referred to all the broadband service providers offering service to that location.
 - Form 477 subscriber count data from all companies will be aggregated by OCTO at the Census Tract level. OCTO will use this information to estimate the residential broadband adoption rate by Census Tract. Estimated broadband service adoption rates will be made public, but the market share of individual broadband service providers will not be revealed.
- **Provider submission form** - For spring 2011, OCTO and PSC revised the data request form. The form is a Microsoft Excel based questionnaire which is accompanied by a glossary. **Appendix 3** contains a copy of the form and glossary. The form collects information on:
 - The Provider (Includes: business name, DBA name, FRN#, URL, etc.)
 - Transmission Technology
 - Business type (facility based or reseller)
 - Service Territory
 - Maximum advertised and typical upload and download speeds
 - Wireless spectrum
 - Middle mile connection points

3. Handling providers – While we hope that all providers complete our forms, not all do. In practice OCTO will accept a variety of submission types and our policy is to work with providers interactively via email and phone whenever we or they have questions.

SECTION 4 - THE ROLE OF DC GEOSPATIAL DATA

DC GIS maintains several datasets that are integral to processing provider submissions. Each dataset and how it is employed is described below:

DC GIS Data Set (Click link to view and double click and zoom)	Description	How the data is used in broadband processing
Imagery	6" resolution 2010 ortho corrected imagery	GIS analysts superimpose provider service territory on imagery to ensure that submission fit the ground in a credible way. For example, do we have wireline service over water or parks?
DC Base Map	1" to 100' planimetric map.	Used similarly to imagery.
Master Address Repository	A precisely located point for every address in the District	Used to process address lists submitted by broadband providers. Also used to locate and map Community Anchor Institutions.
Planning, Landuse and Zoning	Includes existing land use in the District	Used to ensure that broadband providers who provide high speed service to business are not shown as providing service in residential areas.
Education Libraries Health Public Safety Recreation	A variety of GIS layers that include Community Anchor Institutions locations	Used to identify and survey as many Community Anchor Institutions as possible.

SECTION 5 - DATA INTEGRATION

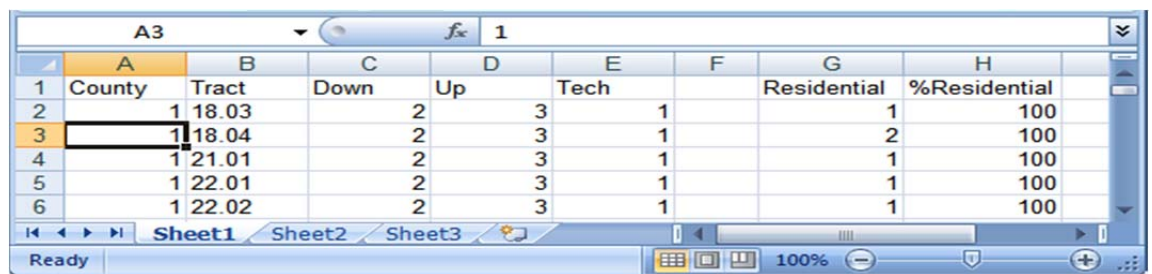
1. Submission Check-in

- Provider data submissions are received in several ways
 - Attachments to emails sent to the PSC.
 - Transfer of data by means of a USB drive.
 - Providers upload the data to a secure OCTO FTP site.
 - Provider mails the data to either PSC or OCTO, if data is received directly by OCTO, a GIS analyst will then check-in the data, make a copy and submit the original to the PSC.
 - Entered into a PSC submission tracking spreadsheet.
 - Scanned for viruses.
 - Given an initial review to ensure that each major component is present.
 - PSC will then contact OCTO that new data has arrived. The transfer of the data from.
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- **Feedback from returning providers** – PSC and OCTO encourage feedback from returning providers. Providers may reference previous submissions and review check plots.
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- **OCTO Submission Processing Data Attributes**
 - After the submission has been checked in by the PSC and received by OCTO, an excel “Provider Status” table is created to follow the progress or status of the broadband data that is being received. The first column lists the date the data was received, the second column, the provider name, the additional columns are represented by the fields in the data model. A “yes” or “no” is placed in the corresponding row of each provider indicating if that data type is received. Processing steps vary based on the type of data submitted [wireless, wire line or middle-mile] and the type of data provided [GIS data, Paper/PDF, data table, etc.].
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- **Wireline Data Processing** - The information that was collected, with regard to the data model on Wireline availability is as follows:
 - Provider Name
 - Doing Business As
 - FRN (Federal Registration Number)
 - Census Tract and Block number
 - Technology of Transmission (DSL, Cable, Satellite, etc.)

Technology of Transmission Codes		
Technology Code	Description	Details
10	Asymmetric xDSL	
20	Symmetric xDSL	
30	Other Copper Wireline	All copper-wire based technologies other than xDSL (Ethernet over copper and T-1 are examples)
40	Cable Modem – DOCSIS 3.0	
41	Cable Modem – Other	
50	Optical Carrier/Fiber to the End User	Fiber to the home or business end user (does not include “fiber to the curb”)
60	Satellite	
70	Terrestrial Fixed Wireless - Unlicensed	
71	Terrestrial Fixed Wireless - Licensed	
80	Terrestrial Mobile Wireless	
90	Electric Power Line	
0	All Other	Any specific technology not listed above

- Maximum Download speed (greater than 768 kbps)
 - Maximum Upload Speed (greater than 200 kbps)
 - Typical Download Speed
 - Typical Upload Speed
- **OCTO Submission Processing Geographic**
 - **Service territory description** - In order for a provider to be eligible and have their data processed, the Company’s service territory should offer service to new customers within 10 days of a service order without extraordinary effort. Note: A Company can have multiple service territories within the District of Columbia, and those territories need not be contiguous. NTIA requires that the service territory be mapped to the nearest Census Block. Companies have several options for describing their service territory:
 - Initially, it is necessary to determine whether the Company meets the definition of a **“District-wide broadband service provider.”** The Company must “offer broadband service” to the “entire District of Columbia.” The following definitions apply:
 - **“Broadband service”** is the provision to end users of two-way data transmission to and from the Internet with advertised speeds of at least 768 kilobits per second (Kbps) downstream and greater than 200 Kbps upstream.
 - **“Offer”** means that the Company can provide broadband service to end users (a residential, business, institutional or government entity) within 10 business days of a service order without an extraordinary commitment of additional resources. C also interprets offer to be a commercial service we are not mapping free services such as Wifi hotspots at this time. District of Columbia Government free Wifi hotspots are included in the Community Anchor Data.

- The “**entire District of Columbia**” means that a wireline company offers service to residential, business, institutional, or government end users in every Census Block in the District. This definition expressly excludes parkland, cemeteries, institutional campuses, bodies of water, and military bases. The definition also excludes real estate complexes where the landlord, condominium association, or similar entity controls the provision of wireline service. Even if the firm doesn’t offer service in some or all of these areas, it can still be a District-wide provider, which simplifies the submission. This caused some problems with OCTO’s fall 2010 submission where we now believe some service territories were overstated. In spring 2011 any firm claiming to be a citywide provider received greater scrutiny. In particular providers that service businesses with Ethernet of copper were restricted to reporting service in commercial, high density residential, and industrial areas as shown on the District’s **Existing Land Use Map**.
- If the Company meets the definition of a District-wide broadband service provider, the description of the Company’s service territory is complete. If the answer was “no,” then an option must be selected to describe the Company’s service territory. Any of the following may be attached to the e-mail to describe the Company’s service territory:
- A **Detailed Map(s)** – Submitted maps should delineate the service area boundaries and label all DC streets within those boundaries. The map may be a PDF file. Geographic Information System (GIS) or Computer Aided Design files may be submitted in lieu of a map.
- A **List of Census Blocks** – The Company may provide a list of Census Blocks in which they offer service. The list should be provided in a Microsoft Excel File or Text File with each Census Block listed on a separate row. **Excel File**



	A	B	C	D	E	F	G	H
	County	Tract	Down	Up	Tech		Residential	%Residential
1								
2	1	18.03	2	3	1		1	100
3	1	18.04	2	3	1		2	100
4	1	21.01	2	3	1		1	100
5	1	22.01	2	3	1		1	100
6	1	22.02	2	3	1		1	100

- A **Written Description** – The Company may describe one or more polygons. For example, a service territory in part of downtown could be described as “East of 23rd Street NW, South of K Street NW, West of 17th Street NW, North of Constitution Ave NW. “ Alternatively, the territories can be described by using buffers, for example, “Within 500 feet of 441 4th Street NW Washington DC 20001.”

- **Address File** - If service is only offered to certain addresses, a list of those addresses may be submitted. Address lists (whether for buffering or not) should be submitted in a Microsoft Excel table or text file with each address on a separate row. Address lists are geocode to the structure using the District's **Master Address Repository**. OCTO encourages providers to submit all addresses where service can be provided within 10 days not just the address of current subscribers.
- **Form 477** – The Form 477 already includes a list of Census Tracts where the firm has existing customers. Census Blocks nest within Census Tracts. Optionally, the Company may indicate that it wishes to use the Census Tracts already listed within its Form 477, minus a list of Census Blocks within those Tracts in which it does not offer service.

The screenshot shows a web-based form for data entry. At the top, there are fields for 'Technology of the connections: Cable Modem', 'Census Tract: State: DC County: District of Columbia Census Tract: 1.00'. Below this is a section titled 'DOWNLOAD INFORMATION TRANSFER RATE' with a table of speed ranges. To the left is a section titled 'UPLOAD INFORMATION TRANSFER RATE' with a table of speed ranges. Red circles and arrows highlight specific fields: 'Cable Modem', '1.00', '15', and '100.000'.

UPLOAD INFORMATION TRANSFER RATE:		DOWNLOAD INFORMATION TRANSFER RATE							
	Less than or equal to 200 kbps	Greater than 200 kbps and less than 768 kbps	Greater than or equal to 768 kbps and less than 1.5 mbps	Greater than or equal to 1.5 mbps and less than 3 mbps	Greater than or equal to 3 mbps and less than 6 mbps	Greater than or equal to 6 mbps and less than 10 mbps	Greater than or equal to 10 mbps and less than 25 mbps	Greater than or equal to 25 mbps and less than 100 mbps	Greater than or equal to 100 mbps
Number of Connections:	15								
Percentage Residential:	100.000	%	%	%	%	%	%	%	%
Greater than 200 kbps and less than 768 kbps	5	12		2	2				
Number of Connections:	100.000	100.000		100.000	100.000				
Percentage Residential:	%	%	%	%	%	%	%	%	%

- **Wireless Data Processing-** If the firm is a **wireless broadband (Internet) service provider**, the following questions were asked in a questionnaire:
 - Is Cellular spectrum (824-849 MHz; 862-869 Mhz) used to provide service? (Y/N)
 - Is 700 MHz spectrum (698-758 MHz; 775-788 MHz; 805-806 MHz) used to provide service? (Y/N)
 - Is Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995 MHz) used to provide service? (Y/N)
 - Is Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155) used to provide service? (Y/N)
 - Is Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide service? (Y/N)
 - Is Unlicensed (including broadcast television “white spaces”) spectrum used to provide service? (Y/N)
 - Is Specialized Mobile Radio Service (SMR) spectrum (817-824 MHz; 862-869 MHz; 896-901 MHz; 935-940 MHz) used to provide service? (Y/N)

- Is Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz; 3650-3700 MHz) used to provide service? (Y/N)
- Is Satellite (L-band, Big LEO, Little LEO, 2GHz) spectrum used to provide service? (Y/N)
- Wireless providers often provided a polygon shapefile of their coverage areas and if they were a existing provider they communicated if the coverage information has changed. For the most the majority of the wireless providers provided coverage for the entire District.
- **Middle Mile Data Processing** - Broadband service providers were also asked for a list of “middle-mile and backbone interconnection points” in the District of Columbia. Interconnection points are facilities that provide connectivity between (a) a service provider’s network elements (or segments) or (b) between a service provider’s network and another provider’s network, including the Internet backbone. (Collectively, (a) and (b) are middle-mile and backbone interconnection points. Middle-mile and backbone interconnection points typically enable relatively fast data rates, are built to handle substantial capacities, and may be service-quality assured. Examples might include: points of interconnection enabling communications between an incumbent local exchange carrier’s central office and the Internet, between a cable aggregation point (headend) and the Internet, or between a wireless base station and the provider’s core network elements that connect to other networks, including the Internet.

Record Format for Middle-Mile and Internet Backhaul Connection Points Data for Each Provider			
Field	Description	Type	Example
Provider Name	Provider Name	Text	ABC Co.
DBA Name	Doing-business-as name	Text	Superfone, Inc.
FRN	FCC Registration Number	Integer	8402202
Ownership	Is the facility owned (0) or leased (1)?	Integer	0
Serving Facility Capacity	Serving capacity of transport facility (see details below)	Integer	1
Serving Facility Type	Type of transport facility (1=Fiber; 2=Copper; 3=Hybrid Fiber Coax (HFC); 4=Wireless)	Integer	1
Latitude	Latitude in decimal degrees	Float	38.884560
Longitude	Longitude in decimal degrees	Float	-77.028123
Elevation	Elevation relative to grade to the nearest foot (positive integers indicate above grade, negative below grade)	Integer	-10

- Providers were asked to fill out an excel spreadsheet asking information based on the table shown above. Providers were asked if they had middle mile locations within the DC area and to list each location in the table on the spreadsheet. Locations that fell within the DC area were geocoded and a point file was created.

Data Review and Consultation with Providers

- If a component of the submission is missing, the OCTO GIS analyst will contact PSC for assistance to receive the missing data from the provider.
 - PSC and OCTO will schedule several meetings before final submittal: to review what providers has submitted data and who has not; and discuss action points that need to be addressed, i.e. which provider needs to be contacted again. Review the process and how it can be improved.
 - The excel “Provider Status” table is reviewed at each meeting and updated several times during the process to follow the progress of the each data submission and to ensure that attempts have been made to contact the provider.
 - As a result of inquiries from NTIA about DC’s round 2 data, we are spending more time talking to providers, particularly those who claim to offer citywide service. Most providers respond openly and are willing to make changes to their submissions when questions are raised.
 - The NTIA receipt script is run against each provider submitted dataset separately. Repairs and reruns are iterated as may be required.
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- **Community Anchor Institutions**

As part of the reporting requirements for the grant, OCTO is required to collect a list of Community Anchor Institutions (CAI). The dataset provides information on the broadband service available at these institutions. The dataset 'District of Columbia Community Anchor Institutions' consists of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities within the District.

 - The data was compiled by OCTO from data submitted by various district agencies and/or institutions contacted directly via a phone and e-mail survey.
 - From this list, DC Government is required to collect specific information on broadband service usage (technology type, and download/upload speeds) for each identified institution.
 - For locations not supported by the District of Columbia, a follow-up survey with the managing agency was conducted to identify the internet service type and service speed. The responses were compiled and attributed as defined by the State Broadband Data and Development Grant Program. Non-government Community Anchors: Non-government community anchors were contacted individually via a phone and e-mail survey. The survey requested the internet service type and service speed at the institution's location(s). The responses were compiled and attributed as defined by the State Broadband Data and Development Grant Program. Appendix 4 contains a copy of the Community Anchor Survey instrument.

- The NTIA receipt script is run against Community Anchor Data separately. Repairs and reruns are made as may be required.

SECTION 6 - DATA VALIDATION

During this stage, data from providers are compared with data from other sources. Discrepancies are noted and sent to the contributing provider for comment. Validation techniques vary by the type of data submitted [wireless, wire line, or middle-mile]. The following steps were taken to validate the data submitted:

1. Wireless Validation - The District completed drive testing of major wireless providers. Drive test were completed in a single vehicle employing multiple laptops and GPS. This was accomplished by installing computer and GPS hardware and software in a vehicle and testing and mapping upstream and downstream transmission speeds. Some new wireless providers were not tested during the second round. These are noted in the validation field of DC's data submission. To this time, DC has not shown the drive test data to providers nor discussed our collection techniques with them. This data was collected with public funds and is not covered by NDAs, but DC has not made a decision to release it publically at this time. The good news is all providers who claim to be providing citywide wireless service are providing it, and to that end DC will declare all providers who submitted service territories to be "valid" in tomorrow's data submittal. That said, speed of service does drop below the definition of broadband, and does vary across providers, place, and time. Appendix 3, describes the wireless verification results. DC did not conduct new drive testing for spring 2011. The fall 2010 drive testing results can be found in **Appendix 5**.

2. Wireline Validation

- The District, through PSC, has made extensive use of FCC Form 477 data. The Form 477 was used to: verify that we have contacted the correct providers; compare the technology of transmission and speed of transmission between what was reported to the FCC and what was submitted by the provider; Compare the geography reported to the FCC in census tracts with the areas submitted to the District in census blocks. Where discrepancies were found, the providers were asked for more information.
- The District purchased a database of broadband subscribers from a commercial mailing list company InfoUSA. The dataset is used to crosscheck data coming from providers. The commercial mailing is not definitive, where discrepancies have been found, the providers were asked for more information. **Appendix 6** contains a sample wireline validation map showing a DSL providers submitted service territory and black dots where InfoUSA reported subscribers.

- **Middle Mile Validation** – To date the district has not attempted to validate middle mile data other than checking locations against GIS base data to be sure they are plausible.
3. **Final Review** – Due directly from question we receive following round 2 about DC’s data submission, all data, now undergoes a standup review conducted jointly by OCTO and PSC staff. Do service territories seem plausible? Do speeds seem realistic? How do speeds compare to other providers using similar technologies? What is the total DSL, Cable, Fiber, coverage does that seem plausible?
4. **Amalgamation and documentation** - Unless a provider's submission is conclusively invalidated (which hasn’t happened) and the issue cannot be resolved with the contributing provider, it is included in the amalgamation phase. Until this stage, OCTO handles each submission separately. During this stage, all successful submissions are appended to the latest version of the NTIA/NSGIC geodatabase model, and FCC-requested transmittal forms are prepared.
- The data is appended to the NTIA geodatabase model.
 - Quality Review the amalgamated data is given a final quality review by the GIS Analysts involved in the broadband grant program.
 - FGDC Compliant metadata is prepared and included in the geodatabase.
 - The NTIA provided script is run for the last time on the data set as a whole.

SECTION 7 - DOCUMENTATION AND SUBMITTAL

Once past the quality review, the data sets are submitted to NTIA/FCC via secure FTP. FCC data package documents are included. The checklist provided by NTIA is followed:

Number	Question
1	Have you obtained a new clean Transfer Data Model?
2	Have you followed the instructions for loading data into the Transfer Data Model?
3	Have you run the receipt process (SBDD_CheckSubmission) and resolved all data integrity issues?
4	Have you included your receipt text file as part of the package?
5	Have you populated the metadata fields?
6	Have you exported the metadata as .xml files?
7	Have you obtained a new data_package.xls and filled it out appropriately?
8	Have you included methodological description?
9	Have you followed the required naming conventions of all the files?
10	If you are resubmitting any data for the current collection, have you (a) deleted your previous submission (b) informed the Program Office or the FCC of your resubmission and (c) resubmitted your entire data package (e.g., the Program Office is not accepting an partial submissions)?

Appendix 1
Sample Letters
From
DC Public Service Commission
To
Perspective Broadband Providers

PSC Letter to Companies that Have Never Submitted Mapping Data

Dear [Virgil: enter name of Priority #2 company's contact],

The District of Columbia Office of the Chief Technology Officer ("OCTO") has been awarded a grant from the U. S. Department of Commerce, National Telecommunications and Information Administration ("NTIA") to map the availability of broadband services in the District of Columbia ("District"). Pursuant to a Memorandum of Understanding, OCTO has delegated to the District of Columbia Public Service Commission ("Commission") the responsibility for all interaction, including data collection, with the broadband service provider community. To meet the objectives under the NTIA's State Broadband Data and Development Grant Program to create national and state broadband service availability maps, the Commission requests the assistance and cooperation of all broadband service providers that enable a residential, business, institutional, or government entity located within the District to use broadband Internet services.

Please note that broadband service providers are requested to submit information regarding technologies and services that they resell and are not limited to providing data only regarding facility-based services.

As you know, the Federal Communications Commission requires broadband service providers to file on March 1, 2011 the Form 477 to provide broadband service data, as of December 31, 2010, for their networks. In order to enable OCTO to identify any improvements or changes in the adoption rates for broadband services within the District, I request that you provide us with a copy of the Form 477 for the [Virgil: insert company's name] ("Company") broadband services in the District of Columbia ("District") which you file with the FCC.

Attached to this email is a copy of OCTO's "District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)" which should be filled out by your Company and submitted along with the copy of the March 1, 2011 Form 477 for the District.

The requested copy of your Company's Form 477 for the District and the completed "District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)" should be submitted to the Commission by Monday, March 7, 2011. The March 1, 2011 Form 477 for the District and the completed Round 3 Questionnaire should be submitted to the Commission as an attachment to an e-mail response to Virgil J. Young, Jr., Senior Telecommunications Analyst, at vyoung@psc.dc.gov. A secure FTP site is available for companies that prefer that method of transmittal.

If the Company does not currently provide broadband Internet services to a residential, business, institutional, or government entity located within the District, please inform the Commission of such fact in an email response to Mr. Young. In such a case, there is no need to submit the Questionnaire.

We are also providing you with a simple Non-Disclosure Agreement (see attachment: “NDA Form.doc” (“NDA”)). The NDA explains how OCTO will handle the submitted data; including what portions of the data will be submitted to the NTIA and what derived products will become part of OCTO’s website on broadband services available in the District. At your discretion, to restrict the distribution of your Company’s submitted data, review, sign, and return the NDA with the submission of the Questionnaire to the Commission.

Thank you for completing this data request. We have attempted to make the process minimally burdensome, but understand that questions may arise. Should you have any questions regarding this request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman

District of Columbia Public Service Commission

Attachments:

1. District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)
2. District of Columbia - Mapping Questionnaire – Definitions
3. NDA Form

PSC Letter co Companies that submitted mapping data in previous rounds.

Dear [Virgil: insert name of Priority #1 company contact],

The District of Columbia Public Service Commission (“Commission”) and the District of Columbia Office of the Chief Technology Officer (“OCTO”) would like to thank you for the Fall 2010 (Round 2) submission of broadband service data to map the availability of the [Virgil: insert company’s name] (“Company”) broadband services in the District of Columbia (“District”).

This email concerns the Company’s Spring 2011 (Round 3) submission. In order to meet the objectives under the National Telecommunications and Information Administration’s State Broadband Data and Development Grant Program to create national and state broadband service availability maps, the Commission requests the assistance and cooperation of all broadband service providers that enable a residential, business, institutional, or government entity located within the District to use broadband Internet services. **Please note that broadband service providers are requested to submit information regarding technologies and services that they resell and are not limited to providing data only regarding facility-based services.**

As you know, the Federal Communications Commission requires broadband service providers to file on March 1, 2011 the Form 477 to provide broadband service data, as of December 31, 2010, for their networks. In order to enable OCTO to identify any improvements or changes in the adoption rates for broadband services within the District, I request that you once again provide us with a copy of the Form 477 for the District which you file with the FCC.

Attached to this email is a copy of OCTO’s “District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)” which should be filled out by your Company and submitted along with the copy of the March 1, 2011 Form 477 for the District.

The requested copy of your Company’s Form 477 for the District and the completed “District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)” should be submitted to the Commission by Monday, March 7, 2011. If applicable, the original Non-Disclosure Agreement with OCTO is still effective and will be honored. The March 1, 2011 Form 477 for the District and the completed Round 3 Questionnaire should be submitted to the Commission as an attachment to an e-mail response to Virgil J. Young, Jr., Senior Telecommunications Analyst, at yyoung@psc.dc.gov. A secure FTP site is available for companies that prefer that method of transmittal.

Should you have any questions regarding this request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman
District of Columbia Public Service Commission

Attachments:

1. District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)
2. District of Columbia - Mapping Questionnaire – Definitions

PSC Letter co Companies only lacking a Form 477

Dear [Virgil: insert name of company contact],

The District of Columbia Public Service Commission (“Commission”) and the District of Columbia Office of the Chief Technology Officer (“OCTO”) would like to thank you for the recent submission of Round 3 broadband service data to map the availability of the [Virgil: insert company’s name] (“Company”) broadband services in the District of Columbia (“District”).

As you know, the Federal Communications Commission requires broadband service providers to file on March 1, 2011 the Form 477 to provide broadband service data, as of December 31, 2010, for their networks. In order to enable OCTO to identify any improvements or changes in the adoption rates for broadband services within the District, I request that you once again provide us with a copy of the Form 477 for the District which you file with the FCC.

The requested copy of your Company’s Form 477 for the District should be submitted to the Commission by Friday, March 4, 2011. As usual, the original Non-Disclosure Agreement with OCTO is still effective and will be honored. The March 1, 2011 Form 477 for the District should be submitted to the Commission as an attachment to an e-mail response to Virgil J. Young, Jr., Senior Telecommunications Analyst, at vyoung@psc.dc.gov. A secure FTP site is available for companies that prefer that method of transmittal.

Should you have any questions regarding this request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman
District of Columbia Public Service Commission

Appendix 2
Standard Non-discloser Agreement

NON-DISCLOSURE AGREEMENT

(District of Columbia Broadband Service Mapping)

This **Non-Disclosure Agreement** (“**Agreement**”) is between the Office of the Chief Technology Officer of the District of Columbia (“OCTO”) and _____ (“Company”), a corporation having a business address at _____.

RECITALS

A. Company wishes to disclose and OCTO wishes to receive certain information from Company represented by Company to be confidential and commercial / proprietary information (hereinafter collectively, “Information”) pertaining to _____. This exchange includes all communication of Information between the parties in any form whatsoever, including oral, written and machine readable form, pertaining to the above.

B. OCTO wishes to receive and Company wishes to disclose the Information for the sole purpose of participating in national broadband service mapping activities. OCTO will disclose the information only in the following ways:

To The public:

- The service territories of individual providers will not be made public, but OCTO will create a public web site that allows users, including potential broadband service subscribers, to enter any valid address in the District of Columbia and be referred to all the broadband service providers offering service to that location.
- Form 477 subscriber count data from all companies will be aggregated by OCTO at the Census Tract level. OCTO will use this information to estimate the residential broadband adoption rate by Census Tract. Estimated broadband service adoption rates will be made public, but the market share of individual broadband service providers will not be revealed.

To the U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA):

- The broadband service data required by the NTIA in the Notice of Funds Availability; [clarification](#) published in the Federal Register; August 7, 2009 (74 FR 40569).

To the Metropolitan Police Department and the District of Columbia Homeland Security and Emergency Management Agency:

- Middle-mile connection points will be added to the District’s critical infrastructure data base. This critical infrastructure database is used only for public safety purposes.

These data will not be shared outside law enforcement and homeland security communities.

AGREEMENTS

Therefore, OCTO and Company agree as follows:

1. That the disclosure of Information by Company is in confidence and thus OCTO agrees to:

a. (1) Not disclose the Information to any other person, and (2) use at least the same degree of care to maintain the Information confidential as OCTO uses in maintaining as confidential its own confidential information, but always at least a reasonable degree of care;

b. Use the Information only for the above purpose;

c. Restrict disclosure of the Information solely to those employees or contract staff of OCTO having a need to know such Information in order to accomplish the purposes stated above; The District Government operates an in-house broadband service provider known as DC Net, accordingly, the Information expressly will not be shared by OCTO with DC Net as an organization or its employees.

d. Advise each such individual, before he or she receives access to the Information, of the obligations of OCTO under this Agreement, and require each such individual to maintain those obligations.

2. This Agreement imposes no obligation on OCTO with respect to any portion of the Information received from Company which: (a) was known to OCTO prior to disclosure by Company, (b) is lawfully obtained by OCTO from a third party under no obligation of confidentiality, (c) is or becomes generally known or publicly available other than by unauthorized disclosure, (d) is independently developed by OCTO or (e) is disclosed by Company to a third party without a duty of confidentiality on the third party.

3. This Agreement imposes no obligation on OCTO with respect to any portion of the Information unless such portion is: (a) disclosed in a written document or machine readable media marked as "COMMERCIAL / PROPRIETARY INFORMATION" at the time of disclosure, or (b) disclosed in any other manner and summarized in a memorandum mailed to OCTO within thirty (30) days of the disclosure. Information disclosed by Company in a written document or machine readable media and marked "COMMERCIAL / PROPRIETARY INFORMATION" includes, but is not limited to, the items, if any, set forth in the request for broadband service data from the District of Columbia Public Service Commission ("Commission"); attached hereto. The Commission's request for broadband service data is incorporated herein by reference. OCTO hereby acknowledges receipt of the items listed in the Commission's request for broadband service data, if any.

4. The Information shall remain the sole property of Company.

5. In the event of a breach or threatened breach or intended breach of this Agreement by either party, the other party shall be entitled to preliminary and final injunctions, enjoining and restraining such breach or threatened breach or intended breach.

6. OCTO agrees it will not export, directly or indirectly, any technical data acquired from Company or any product utilizing any such data to any country for which the U.S. Government or any agency thereof at the time of export requires an export license or other governmental approval, without first obtaining such license or approval.

7. The validity, construction, and performance of this Agreement are governed by the laws of the District of Columbia, and suit may be brought in the District to enforce the terms of this Agreement.

8. The rights and obligations of the parties under this Agreement may not be sold, assigned or otherwise transferred.

This Agreement is binding upon OCTO and Company and upon the directors, officers, employees and agents of each. This Agreement is effective as of the later date of execution and will continue indefinitely.

Office of the Chief Technology Officer of the District of Columbia

By

Name: _____

Title: _____

Date: _____

(Company)

By:

Name: _____

Title: _____

Date: _____

Appendix 3
Provider Questionnaire and Glossary
Microsoft Excel

District of Columbia - Mapping Questionnaire Spring 2011 (Round 3)

This questionnaire has three sheets. Each sheet collects a different type of information. Tabs at the bottom of the workbook allow users to switch among the three sheets.

Date Submitted:<mm/dd/yyyy>	
Company Name:	<Company Name>
Doing Business As:	
FRN #:	
Contact Name:	
Contact Email:	
Contact Address1:	
Contact Address2:	
Contact City, State Zip code:	

1.1 Provide a URL of the Company's website to which the District should refer potential broadband service subscribers.

--

1.2 Is your Company a facility based provider or a reseller? Please select the cell next to the technology that you provide and choose from the dropdown menu which business type applies.

Technology	Business Type	Technology	Business Type
10 Asymmetric		60 Satellite	
20 Symmetric		70 Terrestrial Fixed Wireless - Unlicensed	
30 Other Wireline		71 Terrestrial Fixed Wireless - Licensed	
40 Cable DOCSIS 3.0		80 Mobile Wireless	
41 Cable-Other		90 Electric Power Line	
50 Optical Carrier		0 Other	

1.3 If your company is a reseller, who is the facility based provider(s)?

--

1.4 Complete the following dropdown table for each Technology of Transmission that your company provides. (One row for each Technology of Transmission - click on the cell to view a list of selections per column).

	Technology Transmission		Districtwide	Maximum Advertised Speed		Typical Speed	
	Code	Description		Download Speed	Upload Speed	Download Speed	Upload Speed
(Ex 1)	10	Asymmetric	Yes	768 kbps to 1.49 mbps	201 to 767 kbps	1.5 to 2.9 mbps	768 kbps to 1.49 mbps
1							
2							
3							
4							
5							

*** Districtwide Definition:** The Company must be able to "offer broadband service" to the "entire District of Columbia", (residential, business, institutional or government entity within 10 business days of a service order without an extraordinary commitment of additional resources.) with advertised speeds of at least 768 kilobits per second (Kbps) downstream and greater than 200 Kbps upstream.

1.5 For each Technology of Transmission that was selected in 1.2 how long does it take to provide service to a customer after service has been ordered? (Click on the cell next to each Technology you provide and select the length of time from a drop-down list).

Technology	Length of time to provide service	Technology	Length of time to provide service
10 Asymmetric		60 Satellite	
20 Symmetric		70 Terrestrial Fixed Wireless - Unlicensed	
30 Other Wireline		71 Terrestrial Fixed Wireless - Licensed	
40 Cable DOCSIS 3.0		80 Mobile Wireless	
41 Cable-Other		90 Electric Power Line	
50 Optical Carrier		0 Other	

1.5 Please provide for each Technology of Transmission that was selected in questions 1.2 any of the following data formats for your service area (each data format should include technology of transmission, maximum advertised download and upload speed, typical download and upload speed):

- GIS or CAD file(s)
 - Text file or Excel Spreadsheet listing service addresses
 - Text file or Excel Spreadsheet with a list of Census Blocks with Tract numbers
- (See graphic examples below of data formats)

In addition, please provide your Form 477 as of December 2010. Provide filename for each file provided below:

Ex. of Spreadsheet - Includes Census Tract and Block; Maximum Download and Upload Speeds; Typical

	A	B	C	D	E	F	G	H	I
1	Tract	Block	Technology	Max_Download	Max_Upload	Typ_Download	Typ_Upload	Total_Users	%_Residential
2	17.01	1000	10	8	8	5	3	25	100%
3	18.01	1000	10	8	8	5	3	175	78%
4	19.01	1000	10	8	8	5	3	62	95%

Ex. Text File with Service Address - Includes Provider Name; FRN#; End-User Address; Technology of

Sample_Address_Availability_DC - Notepad											
Provider Name	FRN	ID	End-User Address	City	State	Zip	Technology of Transmission	Maximum Advertised Download Speed			
			Typical Download Speed				Typical Upload Speed				
ACME Corporation	0001-2345-67	1	123 Main ST NW	123	WASHINGTON	DISTRICT OF COLUMBIA	20036	10	8	8	8

Ex. of Form 477 by Census Tract - Includes Technology of Transmission; Census Tract; Transfer Rate;

Technology of the connections: **Cable Modem**

Census Tract: State: **DC** County: **District of Columbia** Census Tract: **1.00**

DOWNLOAD INFORMATION TRANSFER RATE

Greater than 200 kbps and less than 768 kbps	Greater than or equal to 768 kbps and less than 1.5 mbps	Greater than or equal to 1.5 mbps and less than 3 mbps	Greater than or equal to 3 mbps and less than 6 mbps	Greater than or equal to 6 mbps and less than 10 mbps	Greater than or equal to 10 mbps and less than 25 mbps	Greater than or equal to 25 mbps and less than 100 mbps	Greater than or equal to 100 mbps
5	12	2	2				

UPLOAD INFORMATION TRANSFER RATE

Less than or equal to 200 kbps Number of Connections: **100,000**

Percentage Residential: %

Number of users

Less than or equal to 200 kbps	Greater than 200 kbps and less than 768 kbps	Greater than 768 kbps and less than 1.5 mbps	Greater than 1.5 mbps and less than 3 mbps	Greater than 3 mbps and less than 6 mbps	Greater than 6 mbps and less than 10 mbps	Greater than 10 mbps and less than 25 mbps	Greater than 25 mbps and less than 100 mbps	Greater than 100 mbps
100,000	100,000		100,000	100,000				

Percentage Residential: %

Proceed to Sheet 2 if you provide wireless broadband service.

<Company Name>

Wireless Spectrum Questions (Wireline only companies may skip this sheet.)

2.1 Is cellular spectrum (824-849 MHz; 862-869) used to provide service? (Y/N)

"Yes" or "No"

2.2 Is 700 MHz spectrum (698-758 MHz; 775-788 MHz; 805-806 MHz) used to provide service?

"Yes" or "No"

2.3. Is Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995) used to provide service? (Y/N)

"Yes" or "No"

2.4. Is Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155 MHz) used to provide broadband service? (Y/N)

"Yes" or "No"

2.5. Is Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide broadband service? (Y/N)

"Yes" or "No"

2.6. Is Unlicensed (including broadcast television "white spaces") spectrum used to provide broadband service? (Y/N)

"Yes" or "No"

2.7. Is Specialized Mobile Radio Service (SMR) spectrum (817-824 MHz; 862-869 MHz; 896-901 MHz; 935-940 MHz) used to provide broadband service? (Y/N)

"Yes" or "No"

2.8. Is Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz; 3650-3700 MHz) used to provide broadband service? (Y/N)

"Yes" or "No"

2.9. Is Satellite (L-band, Big LEO, Little LEO, 2GHz) spectrum used to provide broadband service? (Y/N)

"Yes" or "No"

Proceed to Sheet 3.

Appendix 4
Community Anchor Survey Instrument
Google Docs

District of Columbia - Community Anchor Institutions

The District of Columbia Office of the Chief Technology Officer ("OCTO") is in the third stage of the State Broadband Data and Development Map Program; awarded by the United States Department of Commerce, National Telecommunications and Information Administration ("NTIA") to map the availability of broadband services in the DC region.

One of the grant requirements is to list and track the availability of broadband service of Community Anchor Institutions ("CAI"):

1. Schools - K through 12
2. Libraries
3. Medical /healthcare
4. Public safety
5. University, college, other post secondary
6. Other community support – government
7. Other community support – nongovernmental

We would appreciate your assistance, as a CAI in the DC region, by filling out the questionnaire below. Please provide your response on or before, Friday, February 4, 2011.

If you have any questions, please feel free to contact either Adeola Dokun at (202) 724-2128 or David Lutz at (202) 478-5887. Thank you for your cooperation.

*** Required**

Contact Name *

Title *

Contact Phone Number: *

Contact Email: *

Name of Institution *

Institution Type *

Select



Address *

Street Address

City, State, Zip ***Institution Website *****Do you currently have broadband (internet) service at this institution? ***☐ Yes☐ No**Name of broadband provider *****What type of Technology of Transmission does the institution use? ***Select **What is the maximum advertised download speed? ***

Data transfer speed

Select **What is the maximum advertised upload speed? ***

Data transfer speed

Select Powered by [Google Docs](#)[Report Abuse](#) - [Terms of Service](#) - [Additional Terms](#)

Appendix 5

Wireless Validation

**Mobile Broadband Mapping
Commercial Cellular Networks
District of Columbia**

Bob Pavlak

Chris San-Gaspar

September 29, 2010

Mobile Broadband Mapping of Commercial Cellular Networks: District of Columbia

Executive Summary

The outdoor downlink and uplink throughput speeds of the commercial cellular networks serving the District of Columbia were measured in September 2010, and compared with measurements made in September 2009. In addition to the three networks tested in 2009 (Verizon Wireless, Sprint, AT&T), our 2010 measurements also include Cricket and T-Mobile.

The results of the drive test measurements are shown in the two attached files (2010 results, and 2009 results), and a qualitative analysis of the results is presented here. A more detailed quantitative analysis will be prepared later.

All five of the service providers deliver broadband service (minimum 768 kbps downlink and 200 kbps uplink) in some areas of the District. However, there is a wide variation in coverage performance. Throughput speeds may be above the “broadband” thresholds in some areas and below the “broadband” thresholds in other areas. This variation in performance is shown by the color codes on the attached citywide maps.

There is also a significant variation in performance between the cellular service providers. The downlink speeds of the AT&T and T-Mobile networks are substantially above the broadband threshold of 768 kbps, with many areas above 1.5 Mbps. The speeds on AT&T’s network are substantially higher in 2010 compared to 2009, which we believe is attributed to the 3G upgrade of the AT&T network to HSPA (High Speed Packet Access), a more recent version of 3G. Both AT&T and T-Mobile operate network infrastructure based on the 3GPP (3rd Generation Partnership Project) set of standards.

The uplink speeds on the AT&T network is by far the highest of any of the commercial service providers. We believe this is due to the more advanced version of the 3GPP standard used by AT&T. Uplink speeds on AT&T’s network exceed 768 kbps and 1.5 Mbps in all but a few areas of the drive route.

The downlink speeds on Verizon’s network, between 2009 and 2010, appear about the same. The uplink performance has improved, with many areas in 2010 above 768 kbps. Many areas in 2009 were above 200 kbps uplink (but less than 768 kbps). Similarly, Sprint’s downlink performance appears about the same between 2009 and 2010, and their uplink performance in 2010 is slightly improved from 2009, but not as high as any of the other service providers.

Sprint, via Clearwire, now offers 4G WiMax broadband service in the District. This network was not included in our broadband drive tests because the mobility performance of WiMax is poor. Sessions are frequently dropped during handoffs and the tool used for drive test measurements is unable to accommodate a high dropped session rate.

The authors wish to thank Felix Igbedior for his assistance in performing the drive tests with Chris San-Gaspar.

Apollo Asset Manager

File Settings Help

Scale Navigation Details

User List Select Field LBS Coverage

GPS Trace Data

Show Data For: Bandwidth

Direction: Download

Data Filter

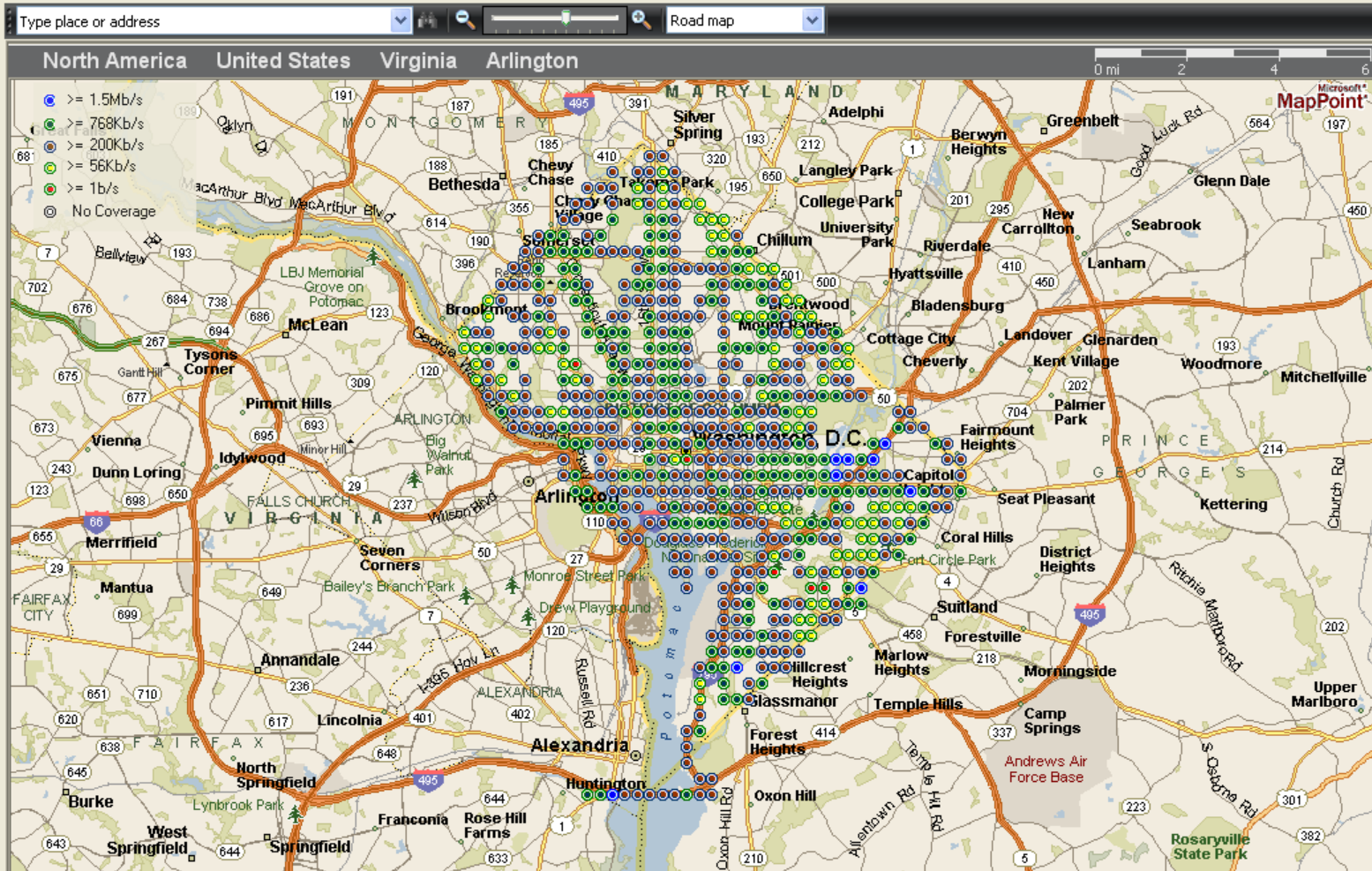
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Network/SSID: PANTECH UM17

Location ID

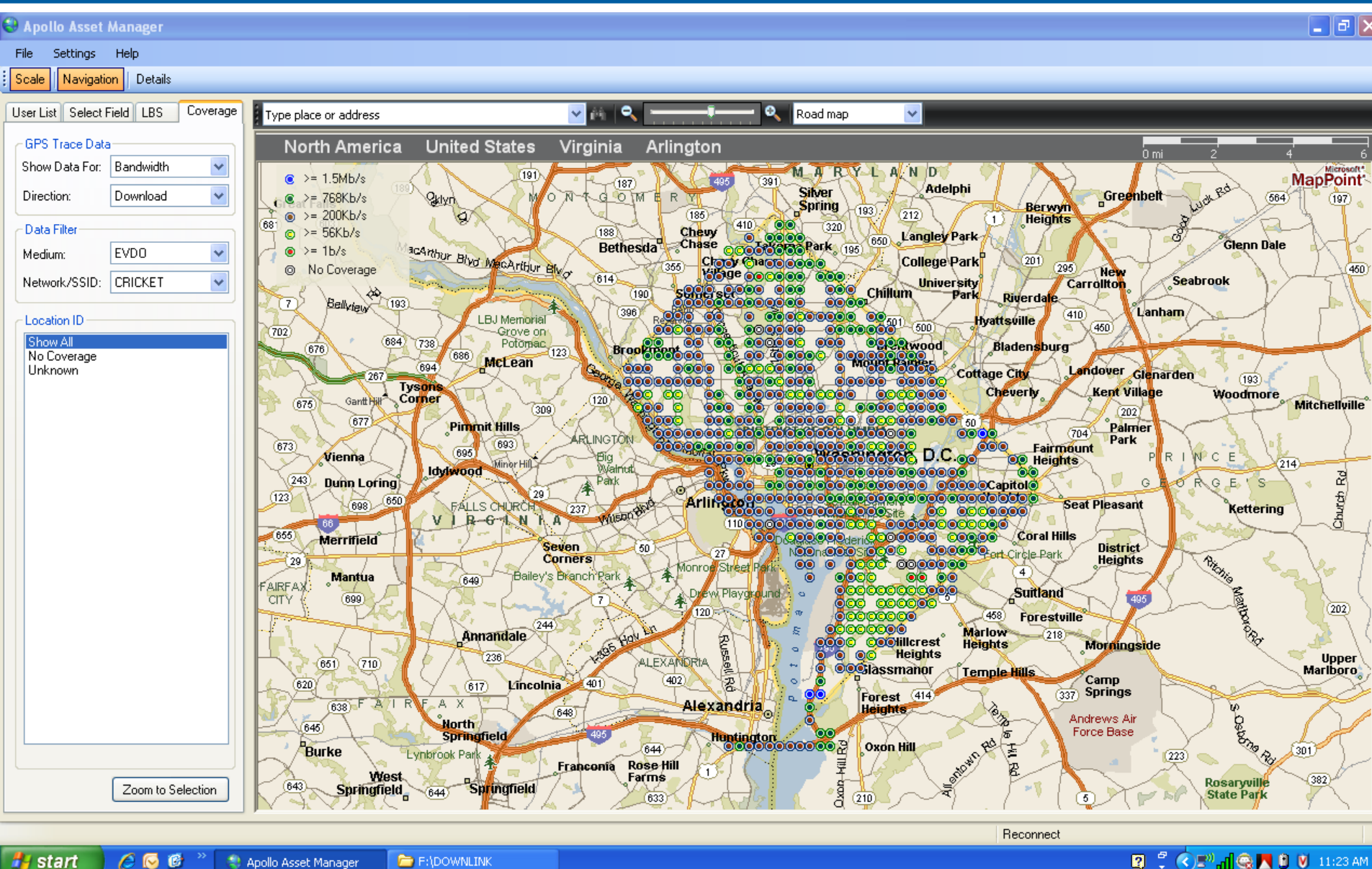
Show All
No Coverage
Unknown

Zoom to Selection



Load data finished

CRICKET DOWNLINK 2010



T-MOBILE DOWNLINK 2010

Apollo Asset Manager

File Settings Help

Scale Navigation Details

User List Select Field LBS Coverage

GPS Trace Data

Show Data For: Bandwidth

Direction: Download

Data Filter

Medium: GPRS/3G

Network/SSID: TMOBILE

Location ID

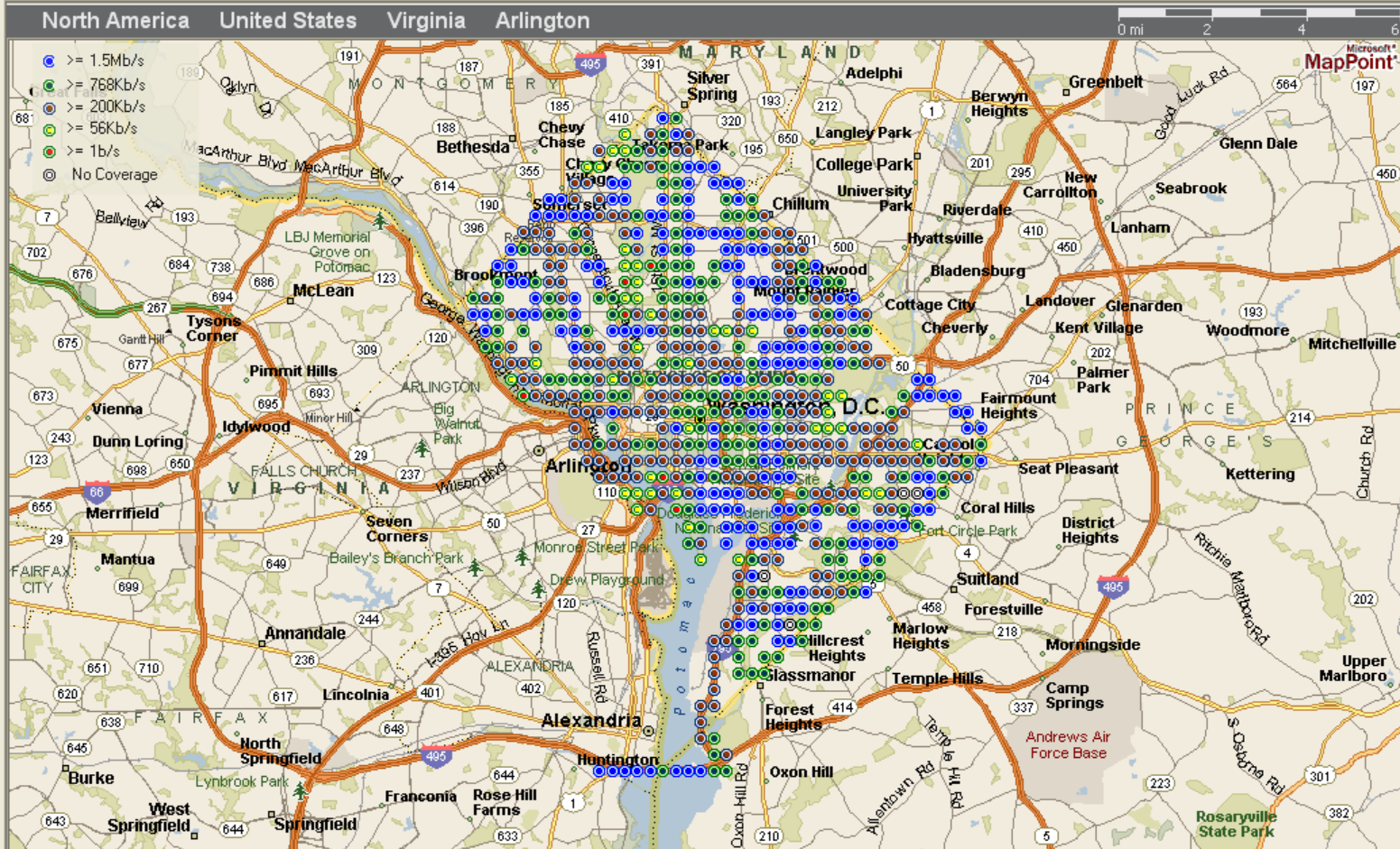
Show All

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B44F-EC11
B44F-EC7E
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B455-EB99
B457-EB47
B457-ECD8
B471-38EEC56
B471-38EEF9D
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B471-38EFA15
B471-38EFA16
B473-2629D63
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B473-262C802
B473-262EBFD
B473-262F16A
B473-262F16B
B473-262F1CD
B475-136A2BE
B475-136EB0D
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B475-136ECOF
B475-136EC39

Zoom to Selection

Type place or address

Road map



Load data finished

Apollo Asset Manager

File Settings Help

Scale Navigation Details

User List Select Field LBS Coverage

GPS Trace Data

Show Data For: Bandwidth

Direction: Upload

Data Filter

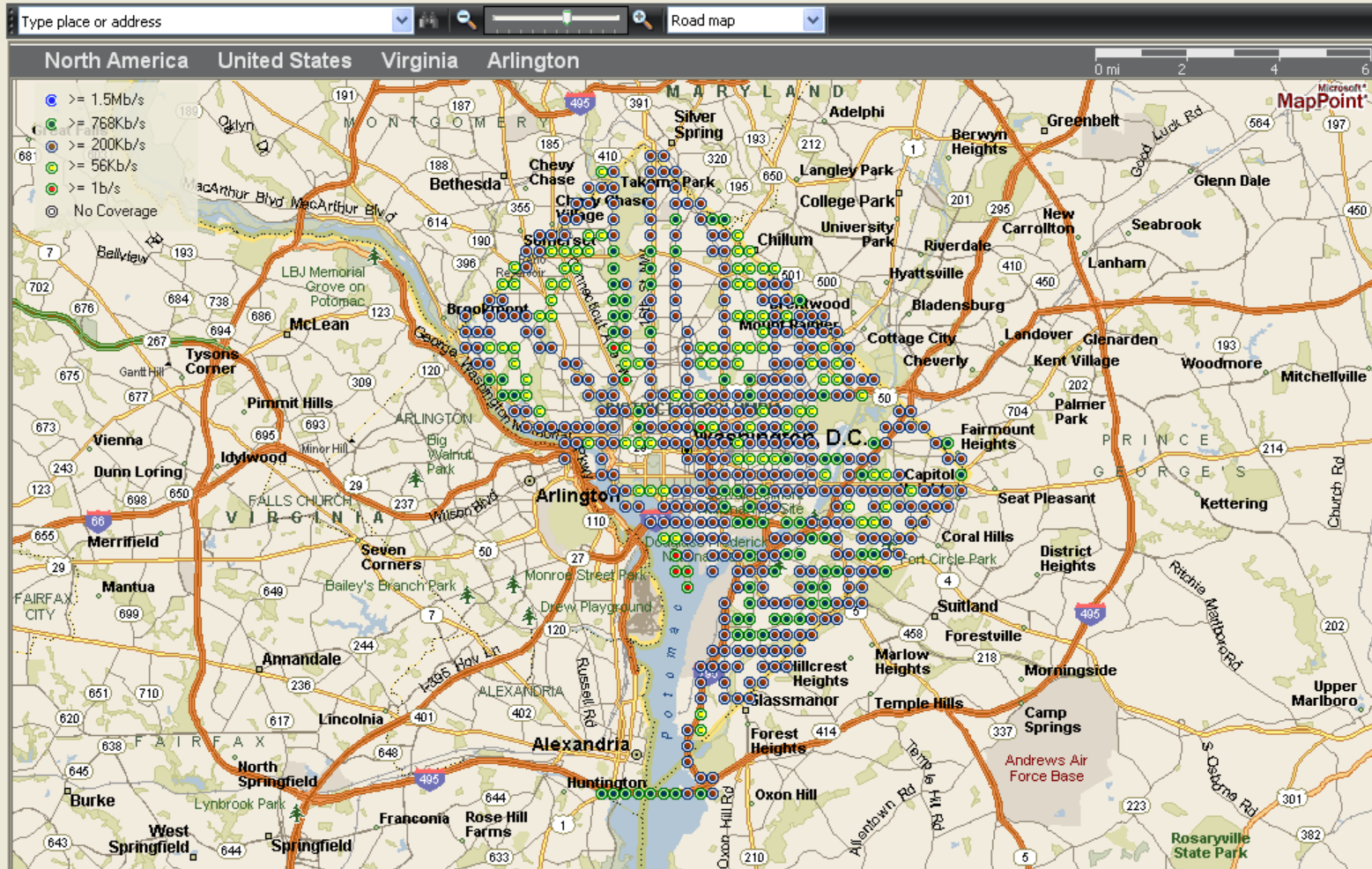
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Network/SSID: SPRINT

Location ID

Show All
No Coverage
Unknown

Zoom to Selection



Reconnect

Apollo Asset Manager

File Settings Help

Scale Navigation Details

User List Select Field LBS Coverage

GPS Trace Data

Show Data For: Bandwidth

Direction: Upload

Data Filter

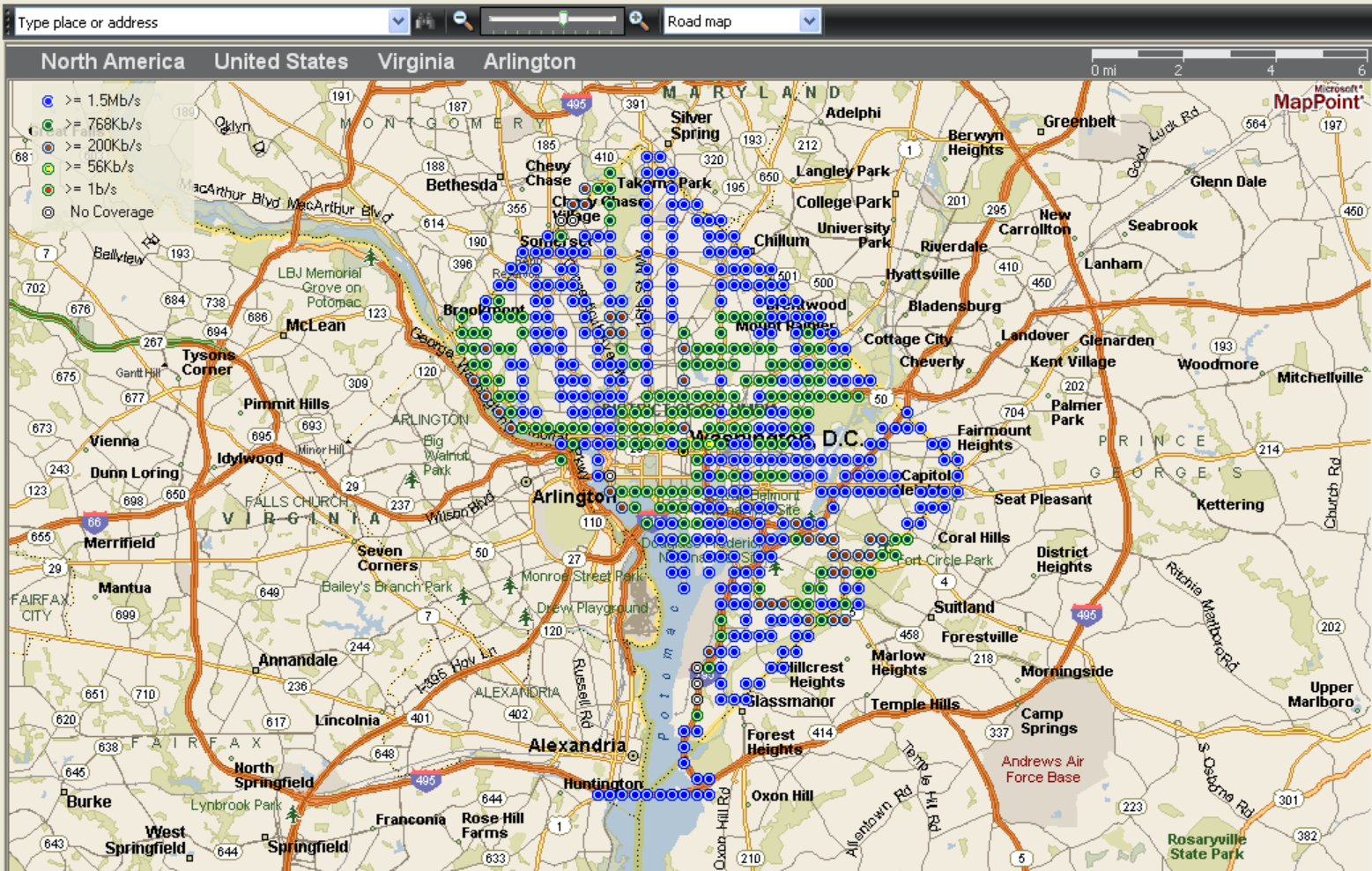
Medium: GPRS/3G

Network/SSID: AT&T

Location ID

Show All
No Coverage
Unknown

Zoom to Selection



Load data finished

Apollo Asset Manager

File Settings Help

Scale Navigation Details

User List Select Field LBS Coverage

GPS Trace Data

Show Data For: Bandwidth

Direction: Upload

Data Filter

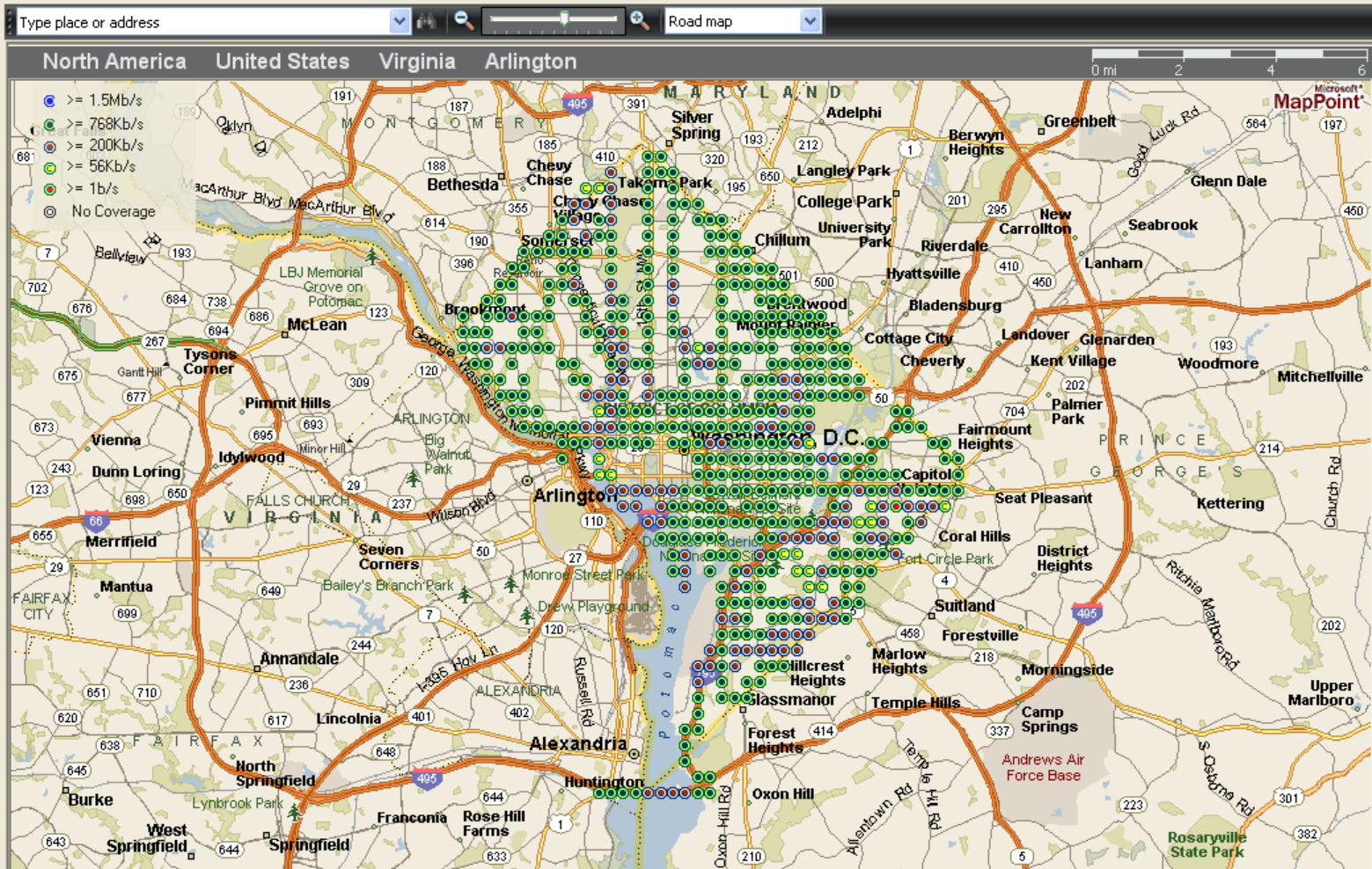
Medium: EVDO

Network/SSID: CRICKET

Location ID

Show All
No Coverage
Unknown

Zoom to Selection



Reconnect

Apollo Asset Manager

File Settings Help

Scale Navigation Details

User List Select Field LBS Coverage

GPS Trace Data

Show Data For: Bandwidth

Direction: Upload

Data Filter

Medium: GPRS/3G

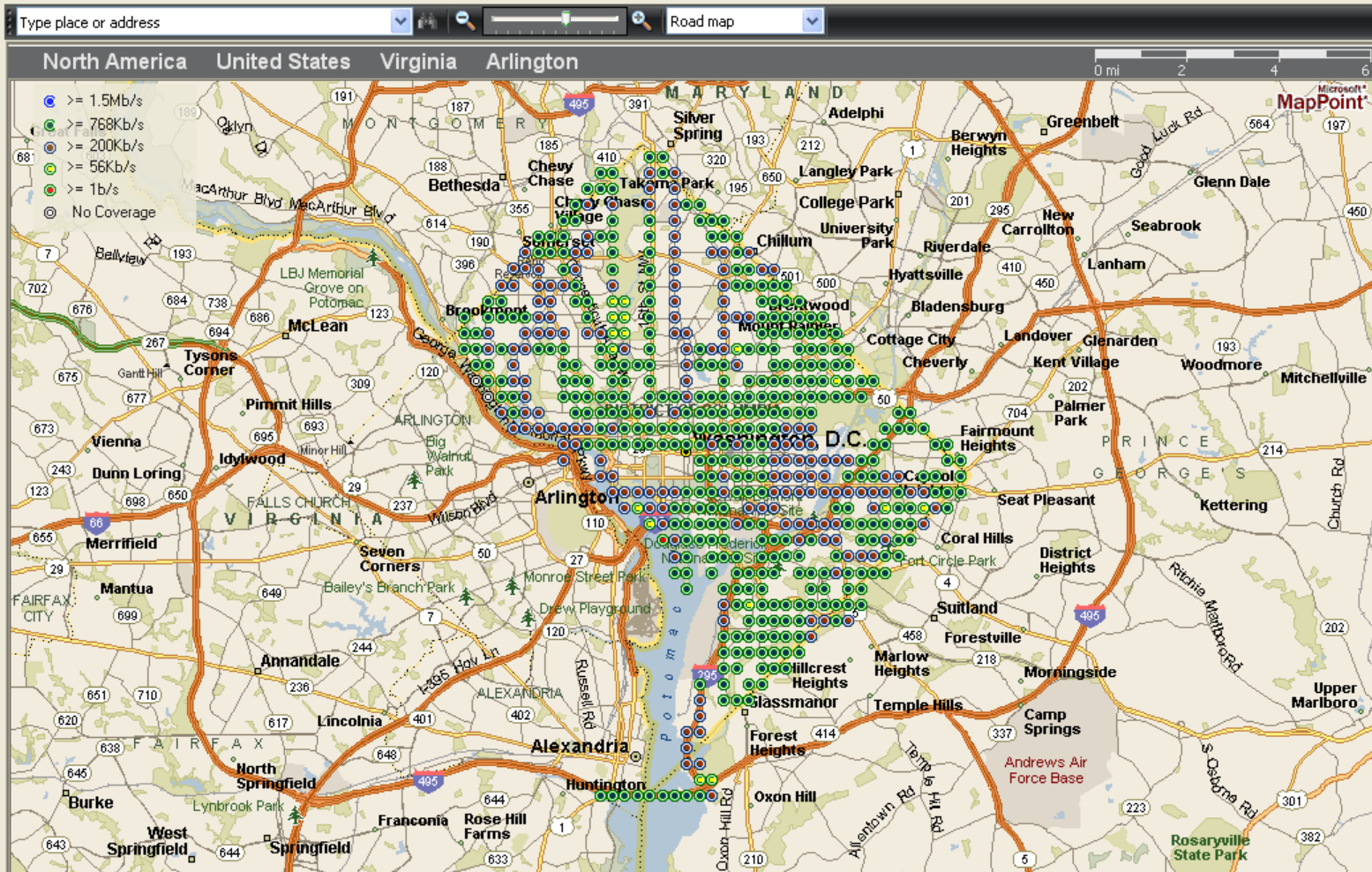
Network/SSID: TMOBILE

Location ID

Show All

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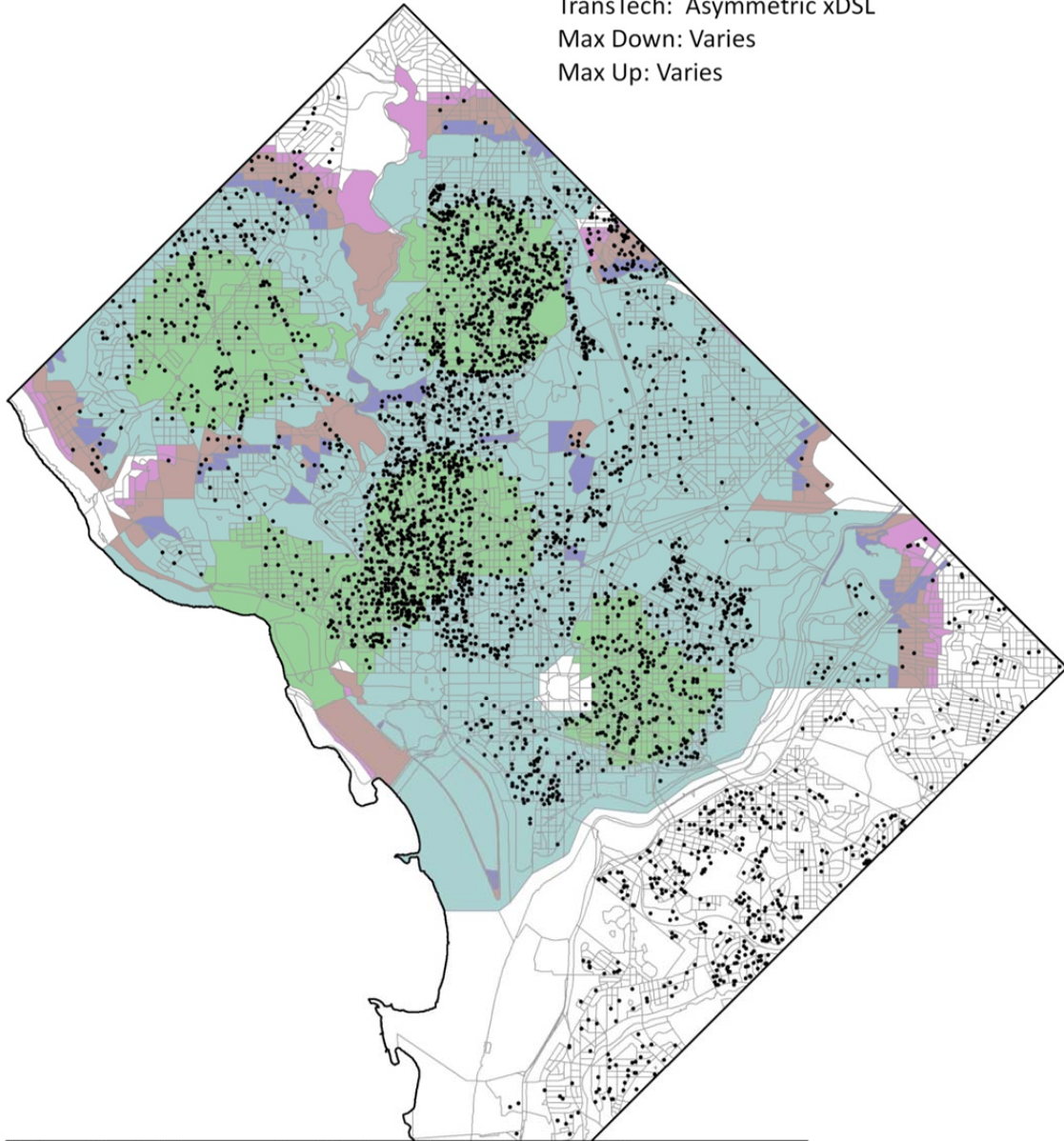
Zoom to Selection








Reconnect

Appendix 6
Wireline Validation Sample

TransTech: Asymmetric xDSL
 Max Down: Varies
 Max Up: Varies



Maximum_Advertised_Downstream_Speed, Maximum_Advertised_Upstream_Speed	
	Greater than or equal to 1.5 mbps and less than 3 mbps., Greater than 200 kbps and less than 768 kbps.
	Greater than or equal to 10 mbps and less than 25 mbps., Greater than or equal to 768 kbps and less than 1.5 mbps.
	Greater than or equal to 3 mbps and less than 6 mbps, Greater than or equal to 768 kbps and less than 1.5 mbps.
	Greater than or equal to 6 mbps and less than 10 mbps., Greater than or equal to 768 kbps and less than 1.5 mbps.
	Greater than or equal to 768 kbps and less than 1.5 mbps., Greater than 200 kbps and less than 768 kbps.