



District of Columbia Fall 2010

State Broadband 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), U.S. Department of Commerce, through the Broadband Data Improvement Act (BDIA), has sponsored the State Broadband Data and Development Grant Program (Program). This 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 October 1, 2010. This data collection is to be conducted on a semi-annual basis over a five-year period. Fall 2010 was the second of ten semi-annual submissions by the District of Columbia and attempts to reflect conditions in the field as between June 1st and August 31, 2010.

Broadband Service 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 was conducted by the PSC. The PSC reviewed its own records and those of the FCC. Most of the identification work took place prior the spring 2010 data call. The PSC reviewed the list of identified providers for fall 2010 and was able to eliminate several firms that were not in business. Firms that identified as doing business in the District had the following characteristics:

1.1. All firms in PSC records as providing any kind of telecommunications service in the District.

1.2. All firms identified by the firms that filed a Form 477 for broadband service in the District.

2. Contacting providers - The PSC requested the assistance and cooperation of all broadband service providers that provide residential, business, institutional, or government entity located within the District, to provide the PSC with broadband service location data. New for fall 2010, 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.

2.1. Non-Disclosure Agreements (NDA) The PSC offers every provider opportunity to enter into a NDA between OCTO and the Provider. 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 in the District that is under construction by OCTO. Key provisions of DC's standard NDA include:

2.1.1. 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.

2.1.2. 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.

2.2. New and returning provider submission request packages - For fall 2010 OCTO and PSC revised our data request packages. Two types of packages were prepared. The package for "**returning providers,**" firms who had submitted data to the District in fall 2010, included a letter from the Chairman of the PSC, a Microsoft Excel based questionnaire, quality control maps show the firm's spring 2010 submission as mapped by OCTO, and database listing showing attribute data as processed by OCTO. Returning providers were asked to review and comment on their spring 2010 submission as processed. The package for "**new providers,**" who had not made a previous submission to the District was simpler. The new provider package included a letter from the PSC Chairman and a Microsoft Excel Questionnaire.

2.3. Returning providers were sent a letter thanking them of their recent submission of data to map the availability of broadband services in the District as well as a data request package. Appendix 1 is a sample “returning provider” data request package. Verizon was chosen as the sample because of the wide variety of services they offer in the District. The following documents were attached with the letter in the data request package.

2.3.1. A District-wide map(s), for each broadband transmission technology offered in the District as of December 31, 2009. Maps were color coded to indicate service coverage areas of the provider vs. non-service areas. Providers were asked to review the map(s) and indicate if the map reflected their service coverage in the District.

2.3.2. A copy of the corresponding database of each transmission technology offered in the District as of December 31, 2009. The database fields reflect the fields in the model for both wireline and wireless. Providers were asked to review the database table(s) and indicate if the database records reflected their service coverage in the District. Providers were also asked to review and provide data for highlighted records that were flagged for having null values.

2.3.3. In addition, instructions, key codes and questionnaire survey were sent as a supplement to aid the provider in completing and providing the necessary information.

2.4. New providers received a letter explaining the Broadband program and its benefits. A questionnaire similar to the one given to existing providers was sent, along with instructions and key codes. New providers were asked to submit mapped information, an address file and Form 477 (See Appendix 2 - sample “new provider” submission request package).

2.5. PSC staff sent new or returning submission request packages to providers by email. All providers were encouraged to contact either OCTO for technical questions or PSC for general questions, if they needed assistance or had questions. We received calls from some providers for clarification and provided assistance as needed.

3. Submission Check-in

3.1. Provider data submissions are received in several ways

3.1.1. Attachments to emails sent to the PSC.

3.1.2. Transfer of data by means of a USB drive.

3.1.3. Providers upload the data to a secure OCTO FTP site.*

3.1.4. 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.

3.2. Once a submission is received it is:

3.2.1. Entered into a PSC submission tracking spreadsheet.

3.2.2. Scanned for viruses.

3.2.3. Given an initial review to ensure that each major component is present.

3.2.4. PSC will then contact OCTO that new data has arrived. OCTO signs a transfer of the data from.

4. **Feedback from returning providers** - This is not really a “process step,” but it is interesting relevant information to those accessing the District’s methods and data. Responses to the returning provider packages varied and included the following:

4.1. A few providers indicated that there were no changes as of the initial submission.

4.2. Some resent the database files with corrections.

4.3. One provider indicated that the spring 2010 map only reflected where they had clients, but not their coverage area. They are a reseller and asked their coverage area should reflect that of their facility based provider.

4.4. When we asked some providers to provide typical up and downstream information, we either received a comment that they did not track this information or that they were unwilling to provide it.

5. **OCTO Submission Processing**

5.1. 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.].

5.2. **Wireline Data Processing** - The information that was collected, with regard to the data model on Wireline availability is as follows:

5.2.1. Provider Name

- 5.2.2. Doing Business As
- 5.2.3. FRN (Federal Registration Number)
- 5.2.4. Census Tract and Block number
- 5.2.5. 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

- 5.2.6. Maximum Download speed (greater than 768 kbps)
- 5.2.7. Maximum Upload Speed (greater than 200 kbps)
- 5.2.8. Typical Download Speed
- 5.2.9. Typical Upload Speed
- 5.2.10. **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:
- 5.2.11. 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:
 - 5.2.11.1. **“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 Kpbs upstream.
 - 5.2.11.2. **“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.

5.2.11.3. 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.

5.2.11.4. 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:

5.2.11.4.1. 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.

5.2.11.4.2. 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
1	County	Tract	Down	Up	Tech		Residential	%Residential
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

5.2.11.4.3. 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.”

5.2.11.4.4. 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.

Text File

Provider Name	PRN	ID	end-user address	zip	technology of transmission	Maximum Advertised Download Speed	Typical Upload Speed
Level 3 Communications, LLC			9003-7238-22	1	2020 M ST NW	2020	M ST
WASHINGTON DISTRICT OF COLUMBIA			20036-30	11	11	11	
Level 3 Communications, LLC			9004-7238-22	2	1700 PENNSYLVANIA AVE NW	1700	NW

5.2.11.4.5. 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.

Form 477

Technology of the connection: Cable Modem

Census Tract: State: DC County: District of Columbia Census Tract: 1,00

UPLOAD INFORMATION TRANSFER RATE:	Greater than or equal to 5 kbps and less than 200 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:	5							
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:	%	%	%	%	%	%	%	%

5.3. Wireless Data Processing- If the firm is a **wireless broadband (Internet) service provider**, the following questions were asked in a questionnaire:

5.3.1. Is Cellular spectrum (824-849 MHz; 862-869 Mhz) used to provide service? (Y/N)

- 5.3.2. Is 700 MHz spectrum (698-758 MHz; 775-788 MHz; 805-806 MHz) used to provide service? (Y/N)
- 5.3.3. Is Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995 MHz) used to provide service? (Y/N)
- 5.3.4. Is Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155) used to provide service? (Y/N)
- 5.3.5. Is Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide service? (Y/N)
- 5.3.6. Is Unlicensed (including broadcast television “white spaces”) spectrum used to provide service? (Y/N)
- 5.3.7. 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)
- 5.3.8. Is Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz; 3650-3700 MHz) used to provide service? (Y/N)
- 5.3.9. Is Satellite (L-band, Big LEO, Little LEO, 2GHz) spectrum used to provide service? (Y/N)
- 5.3.10. 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.

5.4. 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

5.4.1. Providers were asked to fill out an excel spreadsheet asking information based on the table shown above. They were also 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.

6. Data Review and Consultation with Providers

- 6.1. 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.
- 6.2. PSC and OCTO will schedule several meetings before final submittal: to review what providers have 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.
- 6.3. 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.

7. Data Verification - 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:

- 7.1. **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.

7.2. Wireline Validation

7.2.1. 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. However, providers who submitted a Form 477 in the spring of 2010 were not required to resubmit the form in fall 2010. This is because of the short time period between the two submissions. As we move to standard 6 month updates DC expects to make collection of the Form 477 more regular.

7.2.2. 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. Where discrepancies have been found, the providers were asked for more information.

7.3. Middle Mile Validation – To date the district has not attempted to validate middle mile data.

8. 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.

8.1. 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.

8.2. 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.

8.3. 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.

9. 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.

9.1. The data is appended to the NSGIC/FCC geodatabase model.

9.2. Quality Review the amalgamated data is given a final quality review by the GIS Analysts involved in the broadband grant program.

9.3. FGDC Compliant metadata is prepared and included in the geodatabase.

10. Transmittal

1.1. Once past the quality review, the data sets are submitted to NTIA/FCC via secure FTP. FCC data package documents are included.

Appendix 1
Sample Returning Provider Submission Request Packet

Email/letter from PSC to provider:

From: Young, Virgil (PSC)
Sent: Friday, August 20, 2010 5:09 PM
To: 'j.henry.ambrose@verizon.com'
Subject: Broadband Data Request - DC2
Importance: High

Dear Mr. J. Henry Ambrose:

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 data to map the availability of the **Verizon Washington, D.C. Inc.** (“Company”) broadband services in the District of Columbia (“District”). 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.

Data submissions are due every six months to NTIA. This letter concerns the Company’s Fall 2010 submission. In order 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.**

Since the Federal Communications Commission does not require broadband service providers to file the Form 477 for their networks, as of June 30, 2010, until September 1, the Commission is only requesting broadband service coverage and attributes data at this time.

Attached to this email is a copy of OCTO’s analysis of the broadband service data previously submitted by the Company to the Commission. The attachments, prepared by OCTO, include a District-wide map(s), “Map(s) DC Broadband Spring 2010 for Review.pdf” (“Map(s)”) for each broadband transmission technology that the Company offered in the District as of December 31, 2009. Service coverage areas are displayed in pink, no-coverage areas are in white, and parks are expressed in green.

The attachments also contain a copy of the corresponding Company “Database DC Broadband Spring 2010 for Review.xls” (“Spring Database”). (This data is based on the Company’s Spring 2010 submittal.) There are individual copies of the Spring Database for wireline broadband service and for wireless broadband service. The wireline Spring Database includes the following information for each census block: “Doing-business-as” name (DBA Name); Census tract; service provider’s FCC registration number (FRN); technology of transmission (Technology);

maximum advertised downstream speed (Maximum Down); maximum advertised upstream speed (Maximum Up); typical downstream speed (Typical Down); and typical upstream speed (Typical Up). The wireless Spring Database includes wireless broadband service data for each census block: cellular spectrum (Cellular); 700 MHz spectrum (MHZ 700); broadband personal communications services spectrum (PCS); advanced wireless services spectrum (AWS); broadband radio service/educational broadband service spectrum (BRS EBS); and unlicensed and business type (Biz Type). Another attachment provides the Company with the “Database Field Definitions” for defining these fields and depicting technology transmission codes, speed tier codes, and business type used in the data set.

The Commission and OCTO request that information highlighted in the attached Map(s) and Spring Database be reviewed by the Company for completeness and quality assurance purposes. In addition, information (Data Fields) that is highlighted in the attached Spring Database must be reviewed and confirmed by the Company to enable OCTO to complete the Fall 2010 analysis for the Company.

We request that all corrections and/or missing data for the Map(s) and Spring Database be updated electronically or by hard copy that will be scanned, saved, and sent electronically. In addition, we ask that the Company complete the attached “DC Broadband Questionnaire – Returning Provider - Fall 2010.xls” (“Questionnaire”) electronically. Complete each tab of the Questionnaire and save the file as “YourCompanyName–BB-DC.xls”. Please refer to the attached “Instructions - DC Broadband Questionnaire – Returning Provider – Fall 2010.doc” for further detailed advice.

The requested Fall 2010 Questionnaire should be submitted to the Commission by September 1, 2010. Also, the original Non-Disclosure Agreement with OCTO (signed by OCTO on March 9, 2010) is still effective and will be honored. The completed 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.

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

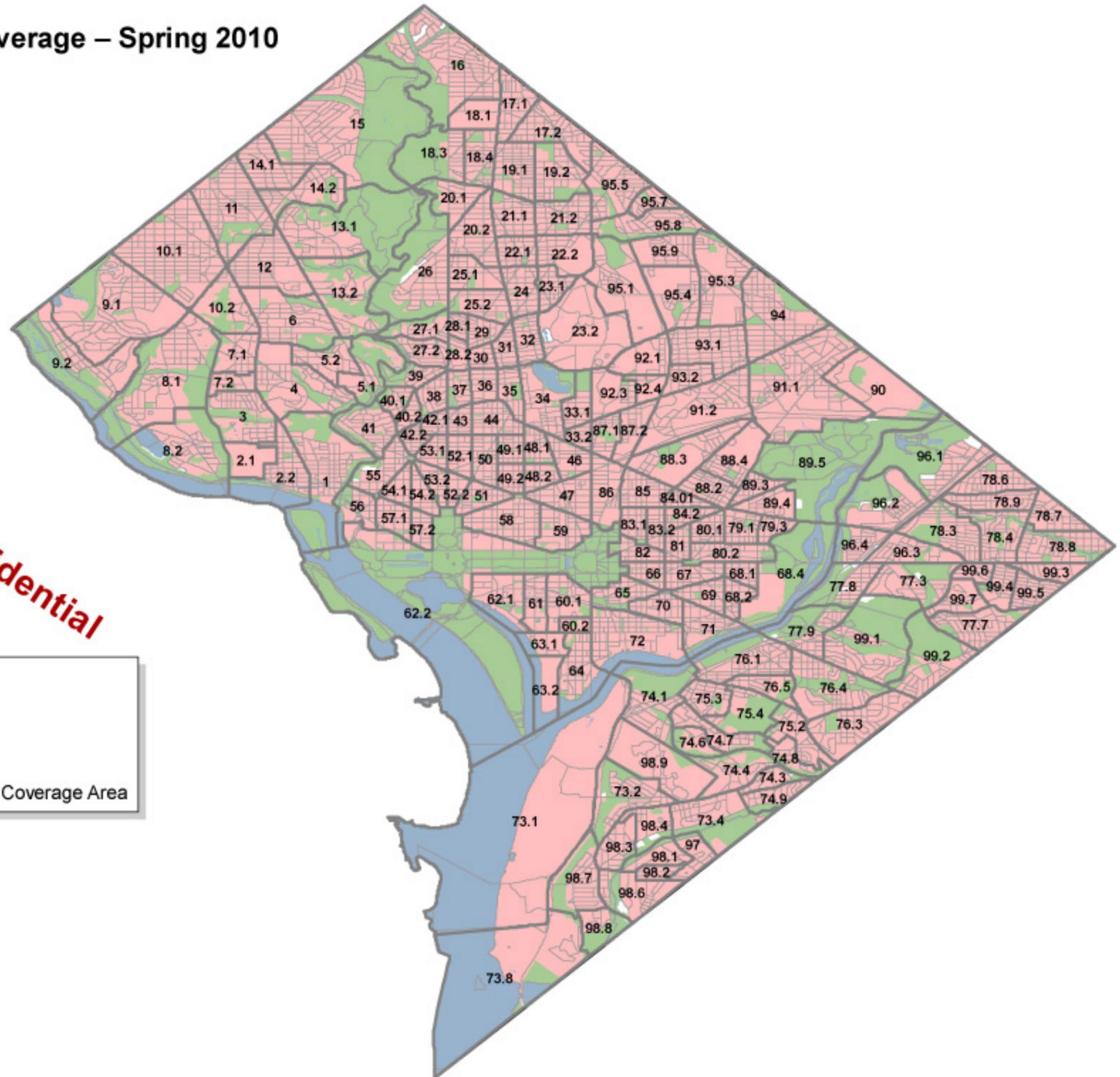
Chairman

District of Columbia Public Service Commission

Attachments:

1. Map(s)_DC_Broadband_Spring_2010_for_Review.pdf
2. Database_DC_Broadband_Spring_2010_for_Review.xls
3. Instructions_DC_Broadband_Questionnaire_Returning_Provider_Fall_2010.doc
4. DC_Broadband_Questionnaire_Returning_Provider_Fall_2010.xls
5. Database_Field_Definitions.pdf

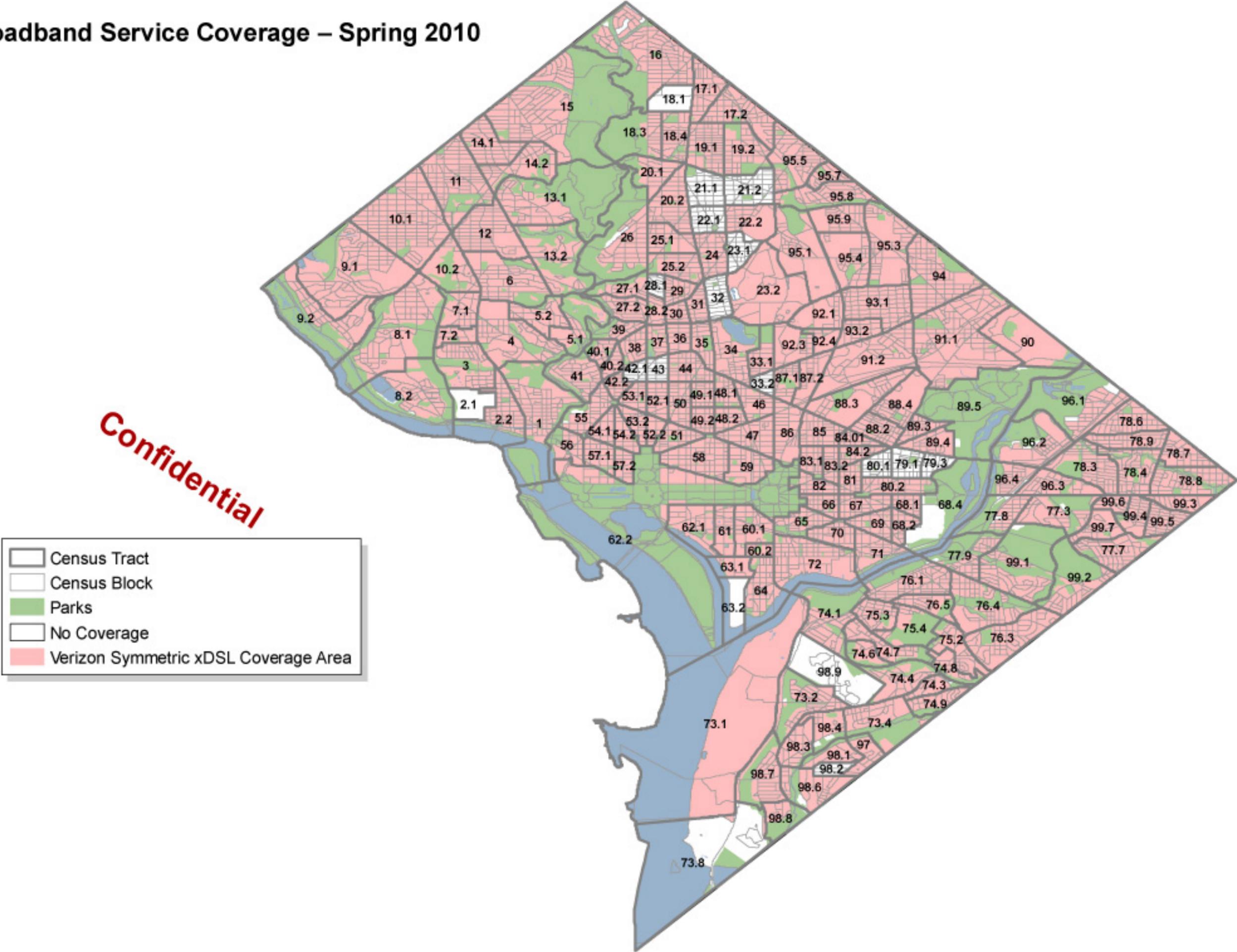
Wireline Broadband Service Coverage – Spring 2010



Confidential

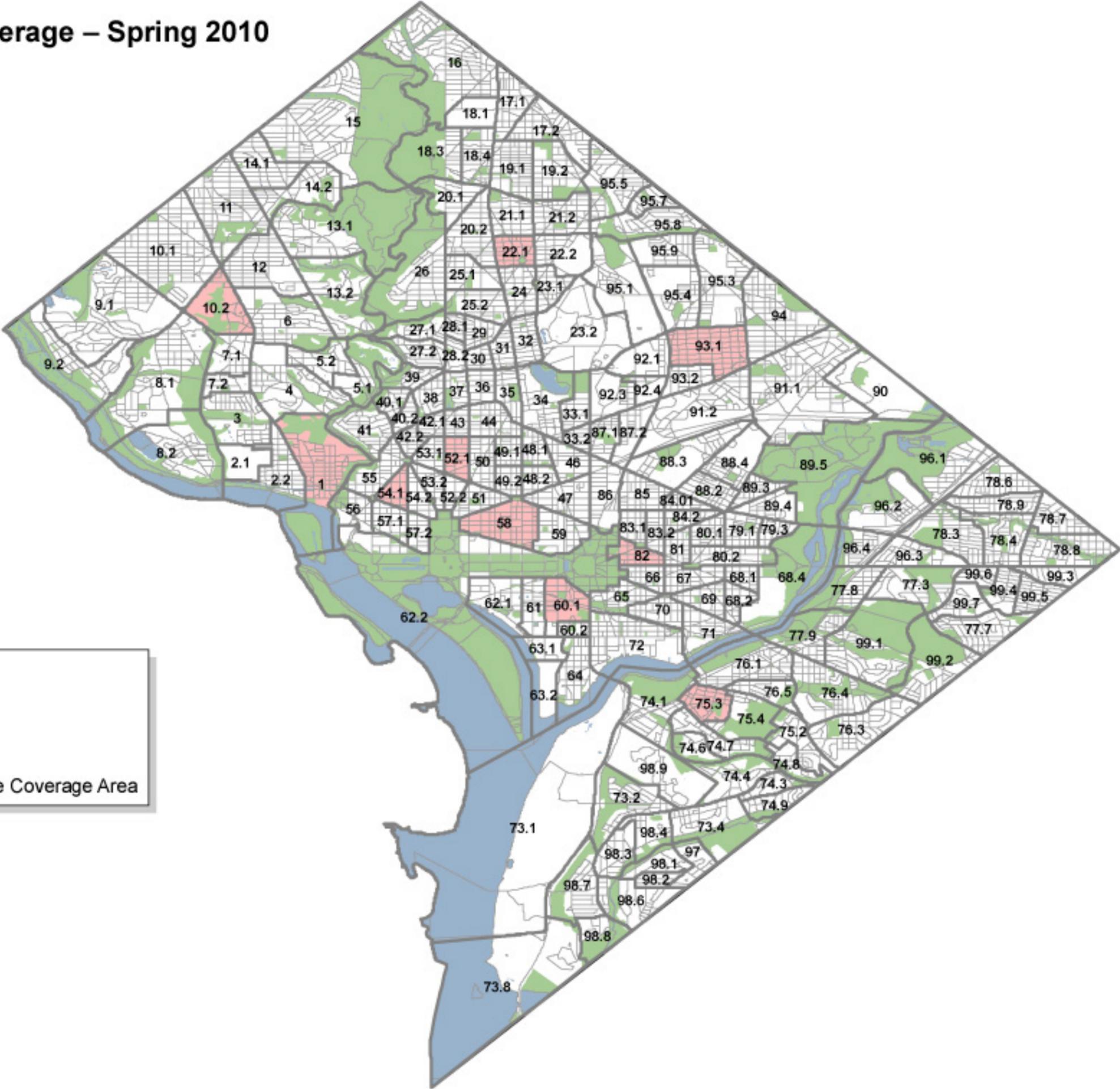
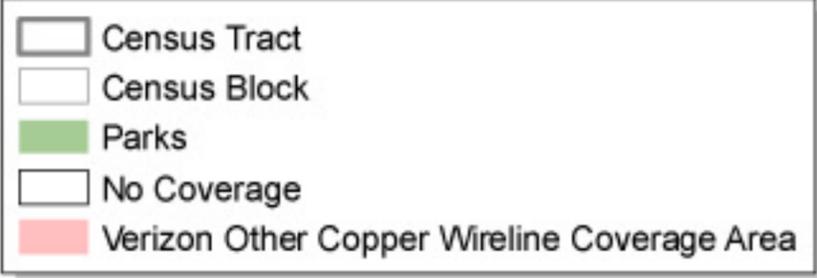
-  Census Tract
-  Census Block
-  Parks
-  No Coverage
-  Verizon Asymmetric xDSL Coverage Area

Wireline Broadband Service Coverage – Spring 2010

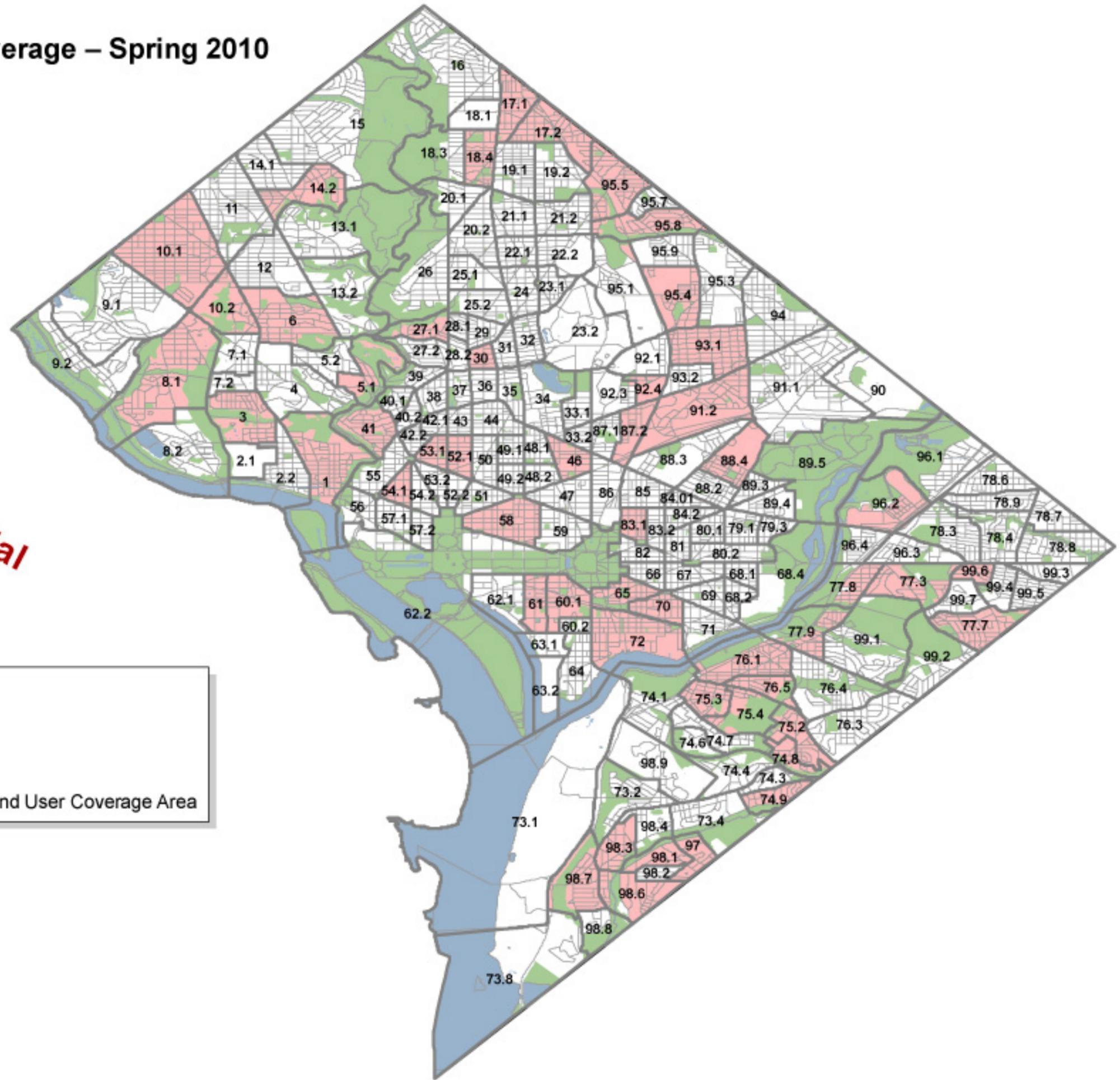


Wireline Broadband Service Coverage – Spring 2010

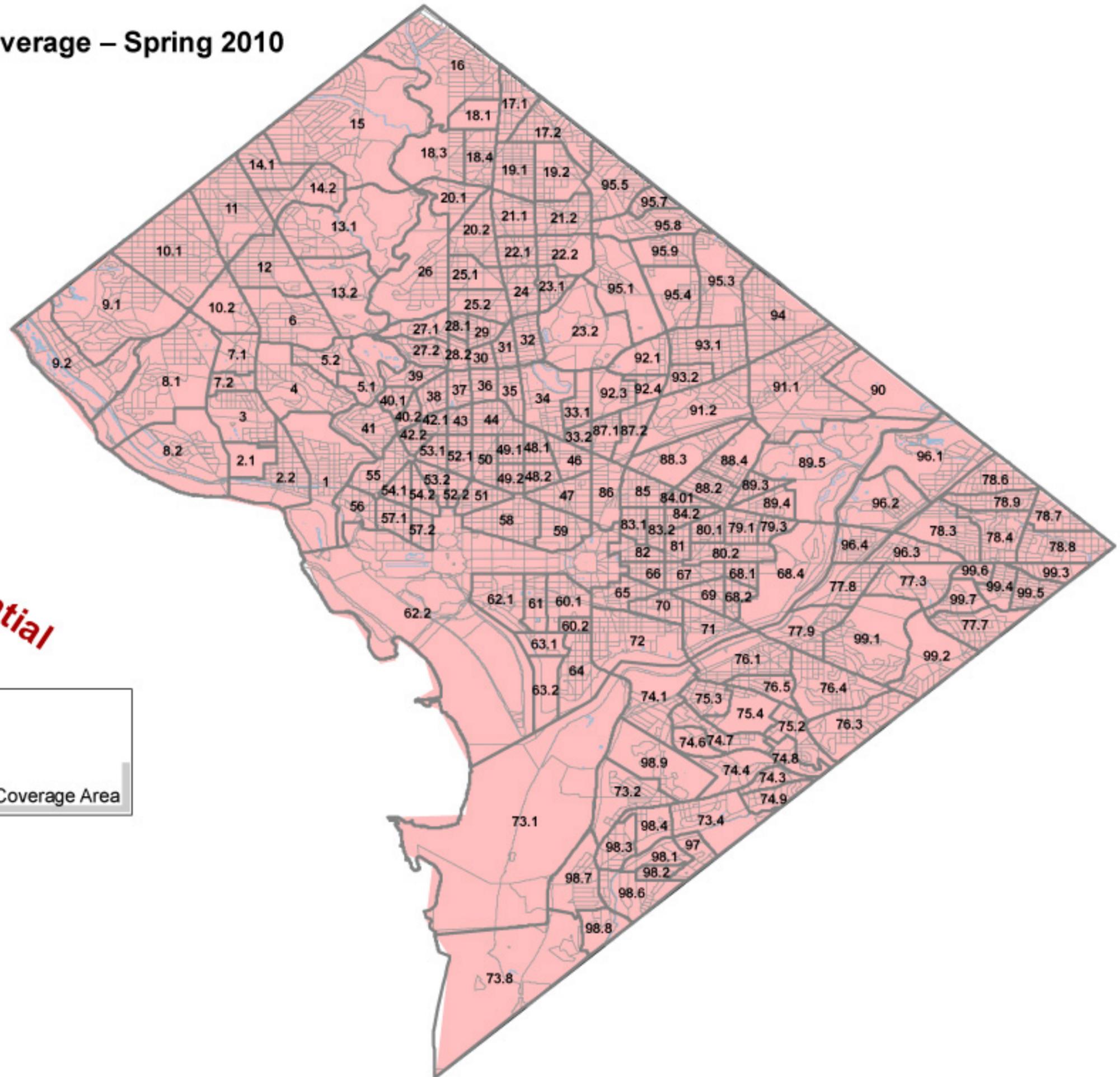
Confidential



Wireline Broadband Service Coverage – Spring 2010



Wireless Broadband Service Coverage – Spring 2010



Confidential



Working with the District of Columbia Data Transmission Questionnaire:

This Microsoft Excel Workbook will serve as the transmittal form for the requested data. Please start by saving the file **YourCompanyName-fall2010-DC.xls(x)** and save periodically as you proceed.

The workbook 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.

Sheet 1.

Company Info: Provide a contact person for this project, including name, mailing address, e-mail address, and phone number. This person may be contacted by OCTO or Commission staff if questions arise regarding your submission. The ideal person will be able to answer technical questions about the submittal.

In 2010 the District will launch a Web site that will link citizens and businesses to all broadband service providers that offer service to their address. These potential customers will be directed to the URL you provide in question 1.1.

If you provide broadband service data to the District of Columbia in Spring 2010 you will receive that data back in the form of one or more PDF maps and one or more data tables. Please review that information and respond to questions 1.2 to 1.5.

Sheet 1 will also request data about the Company's **Service Territory**. The Company's service territory is the geographic area to which the Company offers 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:

District-wide broadband service provider: It is necessary to determine whether the Company meets the definition of a "District-wide broadband service provider" (see question 1.5). For purposes of this question, 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.

- The “**entire District of Columbia**” means that a wireline or wireless company offers service to residential, business, institutional, or government end users in every populated Census Block in the District. This definition expressly excludes wireline service to 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.

Your firm’s “**Business Type**” may be “**Facilities Based**” or “**Reseller,**” or a combination of both. A “Facilities Based” business operates infrastructure (wireline or wireless) that physically provides broadband service. A “Reseller” purchases broadband service from a facilities based provider or another reseller wholesale and resells that service retail. It is possible for providers to be both facilities based and resellers. In such cases, a separate file describing the service territory is required for each unique combination **transmission technology** and business type. Technology of transmission is as described in the pull down menus in table 1.6.

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 is “no,” then 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 by contacting Barney.Krucoff@dc.gov.
- A **List of Census Tracts with Blocks** – Along with this information, please submit the following per census record (see attached key code for details and definition):
 - Technology of Transmission
 - Maximum Download
 - Maximum Upload
 - Typical Download
 - Typical Upload
 - Business Type
- **Spreadsheet/Textfile** – If service is only offered to certain addresses, a list of those addresses may be submitted. Address lists should be submitted in a Microsoft Excel table with each address on a separate row or a text file.

Sheet 2:

Wireless Spectrum: If the firm is a wireless broadband (Internet) service provider, answer these additional questions “yes” or “no”:

- 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)

Sheet 3:

Middle Mile Facilities: Finally, broadband service providers shall provide 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. The list of middle-mile interconnection points is to be provided by completing the table on Sheet 3.

1.7 If your Company is a reseller of any services listed in table 1.6 above, please provide the name of the facility-based provider(s).

[Redacted area]

1.8 Please list and briefly describe any additional attached documents.

[Redacted area]

Please Proceed to Sheet 2.

<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? (Y/N)

"Yes" or "No"

2.3. Is Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995 MHz) 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"

Please proceed to Sheet 3.

Record Definitions	
Field	Definition
Provider Name	Provider Name
DBA Name	"Doing-business-as" Name
FRN	Provider FCC Registration Number
Technology of Transmission	Category of technology available for the provision of service at the address
Maximum Advertised Downstream Speed	Speed tier code for the maximum advertised downstream speed available at the address
Maximum Advertised Upstream Speed	Speed tier code for the maximum advertised upstream speed available at the address
Typical Downstream Speed	Speed tier code for the downstream data transfer throughput rate that most subscribers to service at the maximum advertised downstream speed (above) can achieve consistently during expected periods of heavy network usage
Typical Upstream Speed	Speed tier code for the upstream data transfer throughput rate that most subscribers to service at the maximum advertised upstream speed (above) can achieve consistently during expected periods of heavy network usage.

Appendix 2
Sample New Provider Submission Request Packet

From: Young, Virgil (PSC)
Sent: Wednesday, August 18, 2010 2:05 PM
To: 'darren.mass@masscommgroup.com'
Subject: Broadband Data Request - DC2
Importance: High

Dear Mr. Darren R. Mass:

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.**

Accordingly, the Commission requests that Mass Communications submit a completed “DC Broadband Questionnaire – New Provider - Fall 2010.xls” (“Questionnaire”) no later than September 1, 2010. The Questionnaire and all required attachments 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.

The Questionnaire has three sheets. Complete each tab/sheet of the Questionnaire and save the file as: “Your Company Name–BB-DC.xls”. Please refer to the attached “Instructions - DC Broadband Questionnaire – New Provider - Fall 2010.doc” and the “Database Field Definitions.pdf” for further detailed advice. When submitting the Questionnaire, please rename the Excel file with your Company name. For example, a submission by Broadband Service Provider, Inc. (BSP, Inc.) would be: “BSPINC-BB-DC.xls.”

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: “OCTO NDA.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 the public website on broadband services available in the District that is under construction by OCTO. 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. Instructions_DC_Broadband_Questionnaire_New_Provider_Fall_2010.doc
2. DC_Broadband_Questionnaire_New_Provider_Fall_2010.xls
3. Database_Field_Definitions.pdf
4. OCTO_NDA.doc

Working with the District of Columbia Data Transmission Questionnaire:

This Microsoft Excel Workbook will serve as the transmittal form for the requested data. Please start by saving the file **YourCompanyName-fall2010-DC.xls(x)** and save periodically as you proceed.

The workbook 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.

Sheet 1.

Company Info: Provide a contact person for this project, including name, mailing address, e-mail address, and phone number. This person may be contacted by OCTO or Commission staff if questions arise regarding your submission. The ideal person will be able to answer technical questions about the submittal.

In 2010 the District will launch a Web site that will link citizens and businesses to all broadband service providers that offer service to their address. These potential customers will be directed to the URL you provide in question 1.1.

If you provide broadband service data to the District of Columbia in Spring 2010 you will receive that data back in the form of one or more PDF maps and one or more data tables. Please review that information and respond to questions 1.2 to 1.5.

Sheet 1 will also request data about the Company's **Service Territory**. The Company's service territory is the geographic area to which the Company offers 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:

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Your firm’s “**Business Type**” may be “**Facilities Based**” or “**Reseller**,” or a combination of both. A “Facilities Based” business operates infrastructure (wireline or wireless) that physically provides broadband service. A “Reseller” purchases broadband service from a facilities based provider or another reseller wholesale and resells that service retail. It is possible for providers to be both facilities based and resellers. In such cases, a separate file describing the service territory is required for each unique combination **transmission technology** and business type. Technology of transmission is as described in the pull down menus in table 1.6.

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- 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 by contacting Barney.Krucoff@dc.gov.
- A **List of Census Tracts with Blocks** – Along with this information, please submit the following per census record (see attached key code for details and definition):
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 - Maximum Upload
 - Typical Download
 - Typical Upload
 - Business Type
- **Spreadsheet/Textfile** – If service is only offered to certain addresses, a list of those addresses may be submitted. Address lists should be submitted in a Microsoft Excel table with each address on a separate row or a text file.

Sheet 2:

Wireless Spectrum: If the firm is a wireless broadband (Internet) service provider, answer these additional questions “yes” or “no”:

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- 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)
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Sheet 3:

Middle Mile Facilities: Finally, broadband service providers shall provide 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. The list of middle-mile interconnection points is to be provided by completing the table on Sheet 3.

District of Columbia

DC Broadband Questionnaire – New Provider – Fall 2010

Date Submitted: <mm/dd/yyyy>
 Company Name: <Company Name>
 Doing Business As: <DBA>
 FRN #: <FRN #>
 Contact Name: <Contact Name>
 Contact Email: <Contact Email>
 Contact Address1: <Address Line 1>
 Contact Address2: <Address Line 2>
 Contact City, State Zip code: <City, State Zip Code>

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

1.2 Is the Company a facility-based provider?

"Yes" or "No"

1.3 Is this Company a reseller? If yes, who is the facilities-based provider(s)?

"Yes" or "No"

1.4 Complete the following table.

	Technology Transmission		Maximum Advertised		Typical		Business Type	District-wide	Map Provided	Service Territory Description File Name
	Code	Description	Download Speed	Upload Speed	Download Speed	Upload Speed	Facilities Based or Reseller	Yes/No	Yes/No	
(Ex.1)	10	Asymmetric	768 kbps to 1.49 mbps	201 to 767 kbps	1.5 to 2.9 mbps	768 kbps to 1.49 mbps	Reseller	Yes	No	District-wide, no map required
(Ex.2)	50	Optical Carrier	10 to 24.9 mbps	10 to 24.9 mbps	10 to 24.9 mbps	10 to 24.9 mbps	Facilities based	No	Yes	Map1.shp
1										
2										
3										
4										
5										

1.5 Please provide Form 477 as of March 2010. Additional material may be: GIS or CAD file(s); a text file or spreadsheet listing service addresses; or a list of Census Blocks with Tract numbers. (See examples below.)

(Provide filename and describe format of all attachments.)

Example of Form 477

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
Number of Connections: 5	12		2	2			
Percentage Residential: 100.000%							
Greater than 200 kbps and less than 768 kbps Number of Connections: 100.000	100.000		100.000	100.000			
Percentage Residential: %	%	%	%	%	%	%	%

UPLOAD INFORMATION TRANSFER RATE:

Number of users: 5

Example of 477 data as a spreadsheet

Tract	Block	Technology	Max_Download	Max_Upload	Typ_Download	Typ_Upload	Total_Users	%_Residential
17.01	1000	10	8	8	5	3	25	100%
18.01	1000	10	8	8	5	3	175	78%
19.01	1000	10	8	8	5	3	62	95%

Example of service address

Provider Name	FRN	ID	End-User Address	City	State	Zip	Technology of Transmission	Maximum Advertised Download Speed	Maximum Advertised Upstream 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

Proceed to Sheet 2.

<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 MHz) 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.

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
Wireless Drive Test Verification Summary

**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.

GPS Trace Data

Show Data For:

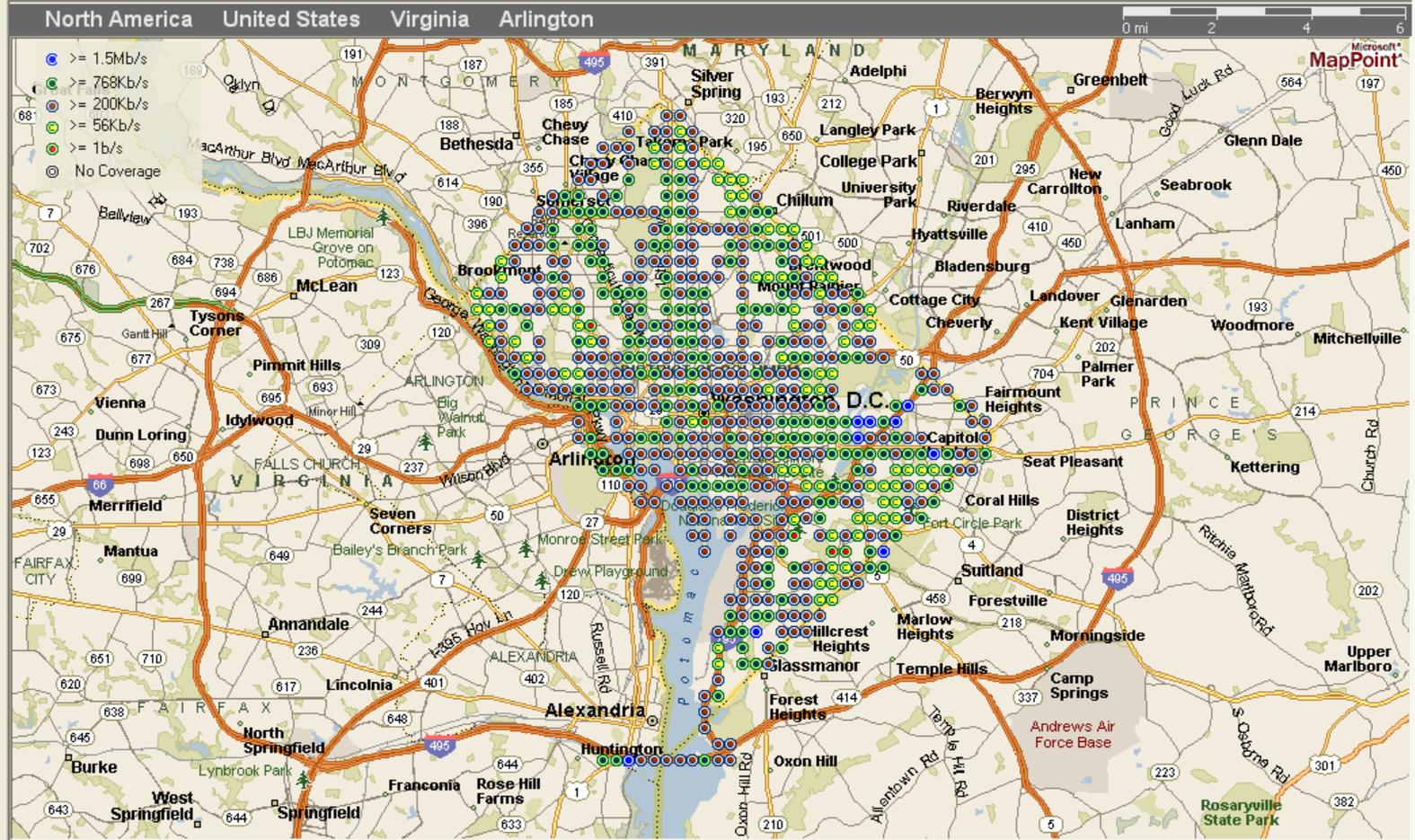
Direction:

Data Filter

Medium:

Network/SSID:

Location ID



Zoom to Selection

Load data finished

GPS Trace Data

Show Data For: **Bandwidth**

Direction: **Download**

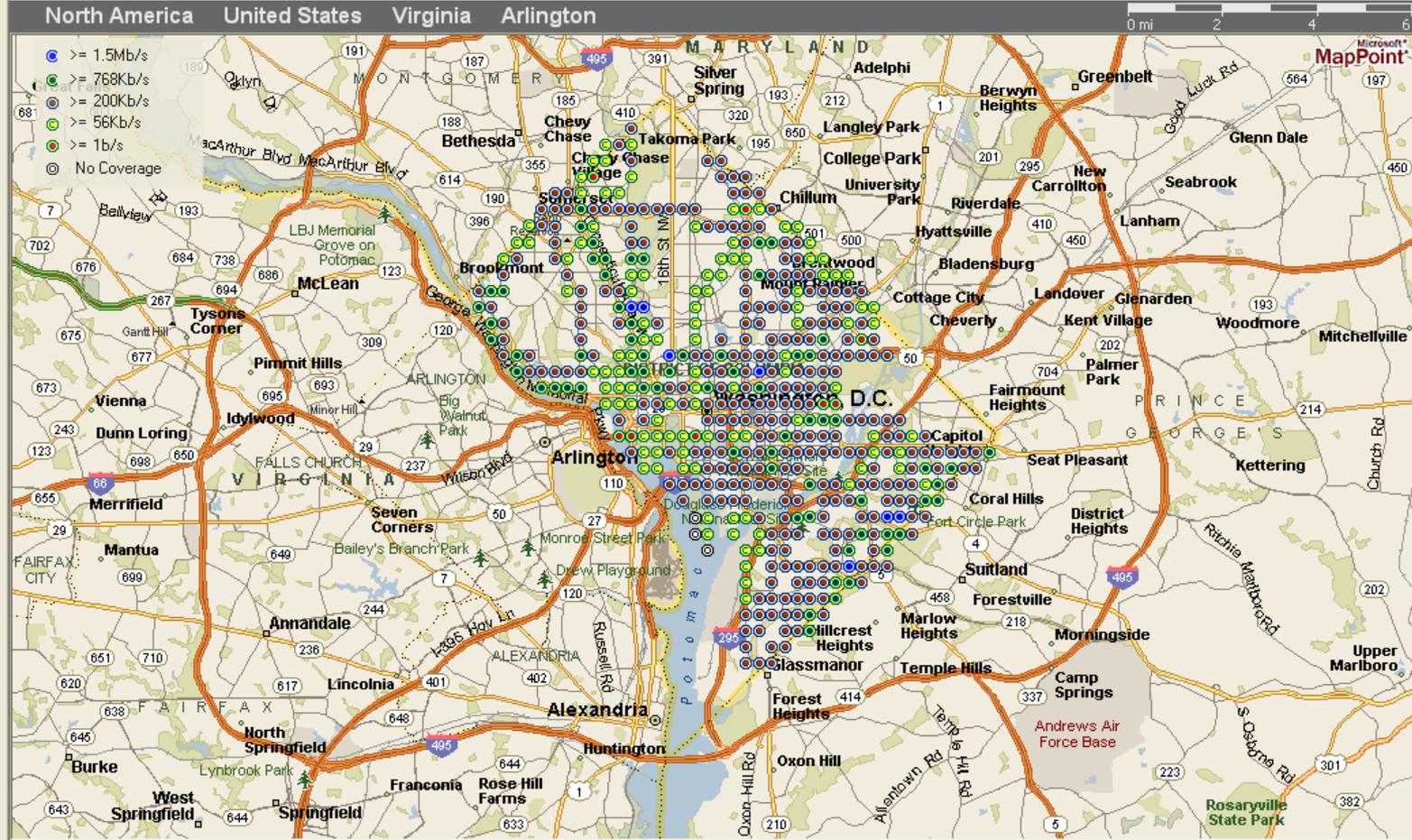
Data Filter

Medium: **EVDO**

Network/SSID: **SPRINT**

Location ID

Show All
No Coverage
Unknown



Load data finished

GPS Trace Data

Show Data For: Bandwidth [v]

Direction: Download [v]

Data Filter

Medium: GPRS/3G [v]

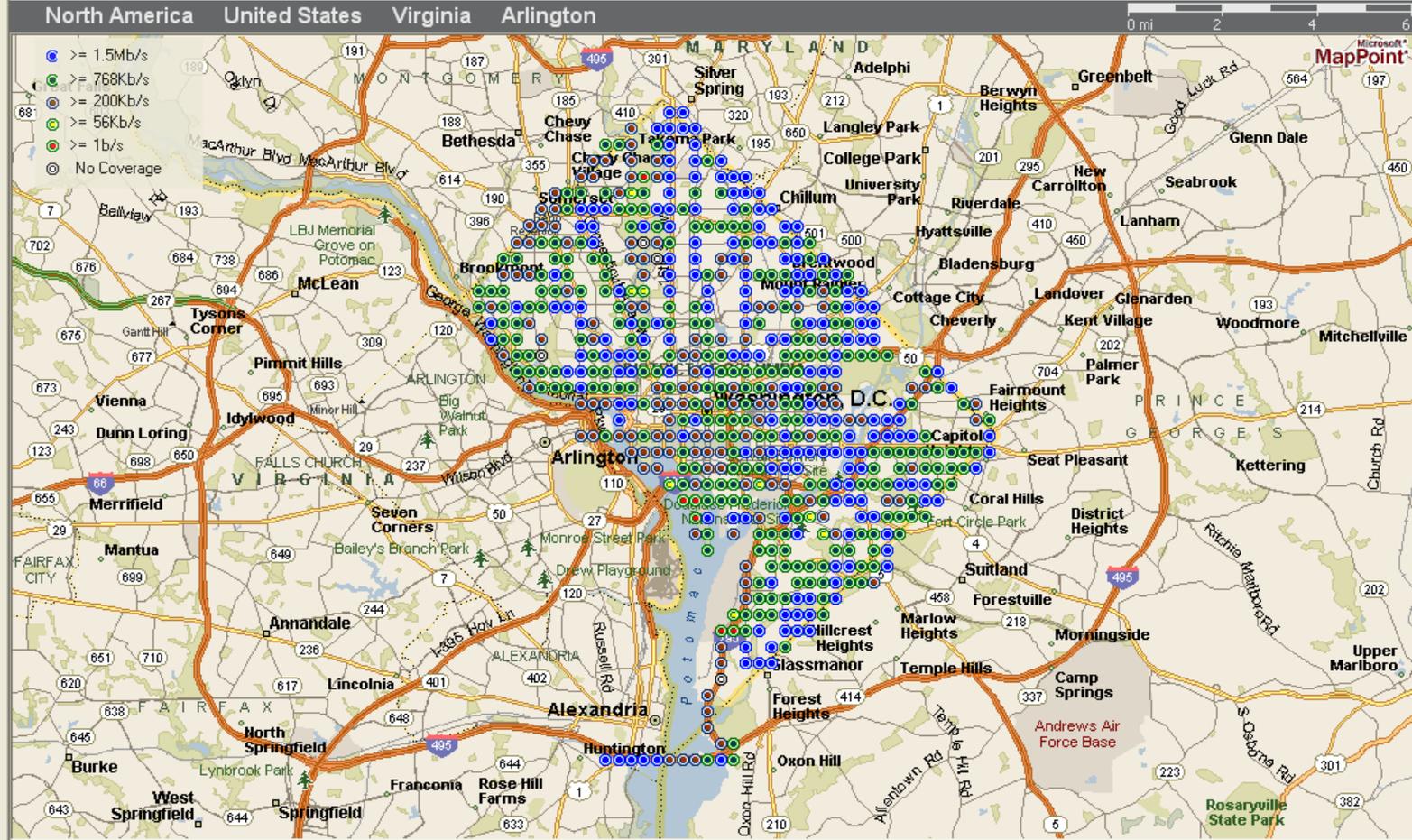
Network/SSID: AT&T [v]

Location ID

Show All [x]

No Coverage [x]

Unknown [x]



Reconnect

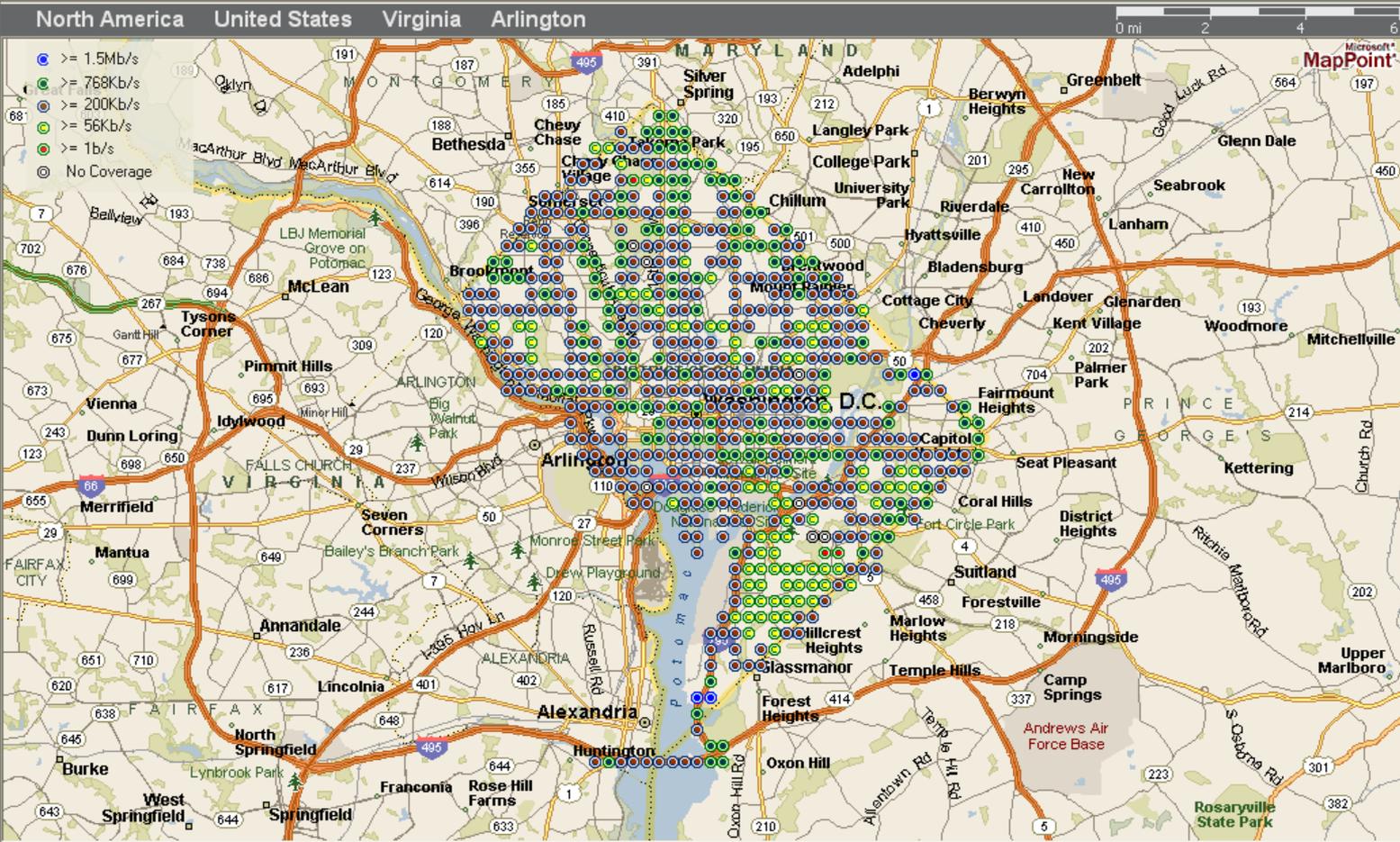
Apollo Asset Manager

File Settings Help

Scale Navigation Details

User List Select Field LBS Coverage

Type place or address [Search Icon] [Zoom Icon] [Map Style: Road map]



GPS Trace Data

Show Data For: **Bandwidth**

Direction: **Download**

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

Type place or address Road map

GPS Trace Data

Show Data For:

Direction:

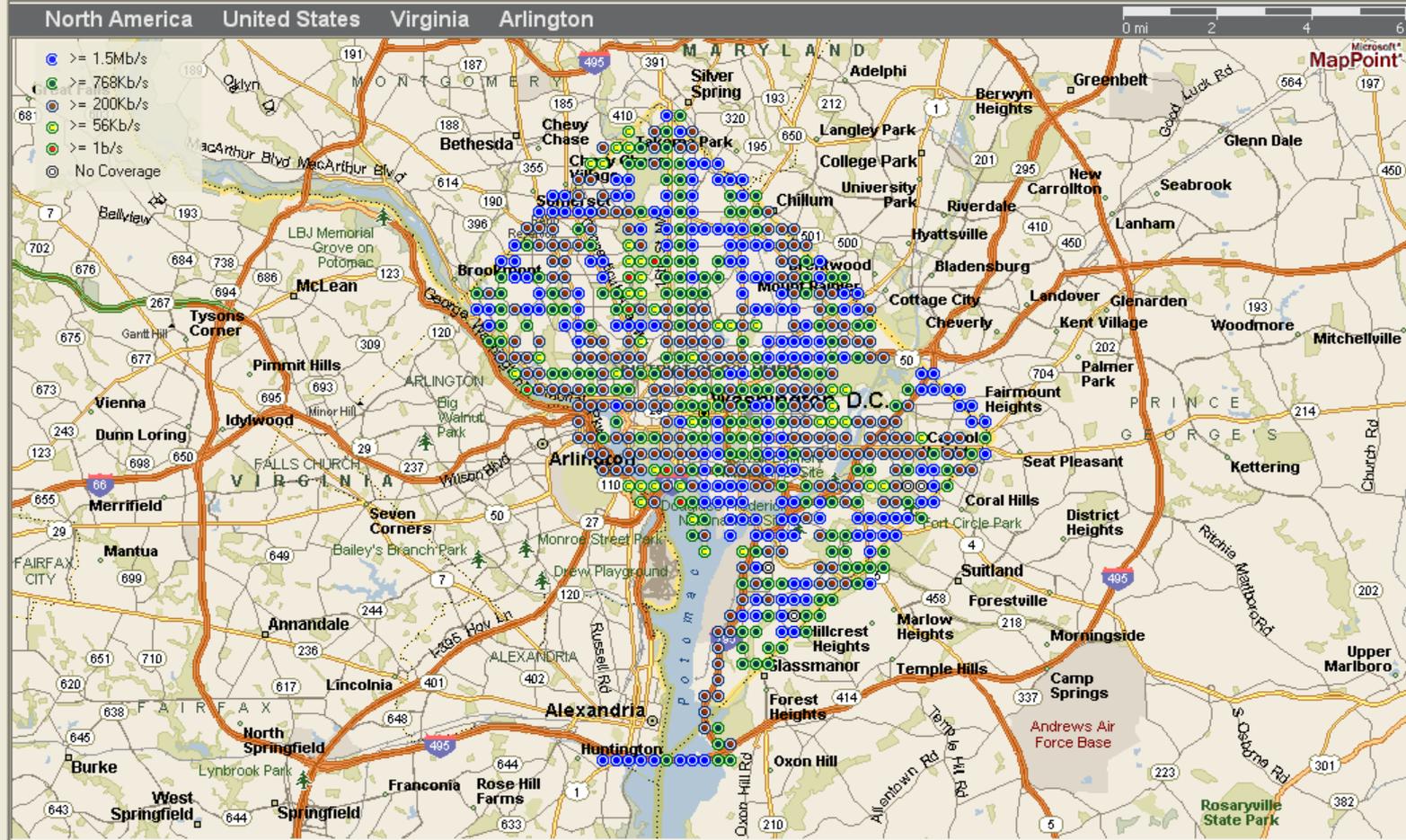
Data Filter

Medium:

Network/SSID:

- Location ID**
- Show All
- B44B-EECC
 - B44B-FC32
 - B44F-C619
 - B44F-EC11
 - B44F-EC7E
 - B45A-EB33
 - B45A-F137
 - B455-EB99
 - B457-EB47
 - B457-ECD8
 - B471-38EEC56
 - B471-38EEF9D
 - B471-38EF110
 - B471-38EFA15
 - B471-38EFA16
 - B473-2629D63
 - B473-262C801
 - B473-262C802
 - B473-262EBFD
 - B473-262F16A
 - B473-262F16B
 - B473-262F1CD
 - B475-136A2BE
 - B475-136EB0D
 - B475-136EB34
 - B475-136EBAC
 - B475-136EC0F
 - B475-136EC39

Zoom to Selection



Load data finished

GPS Trace Data

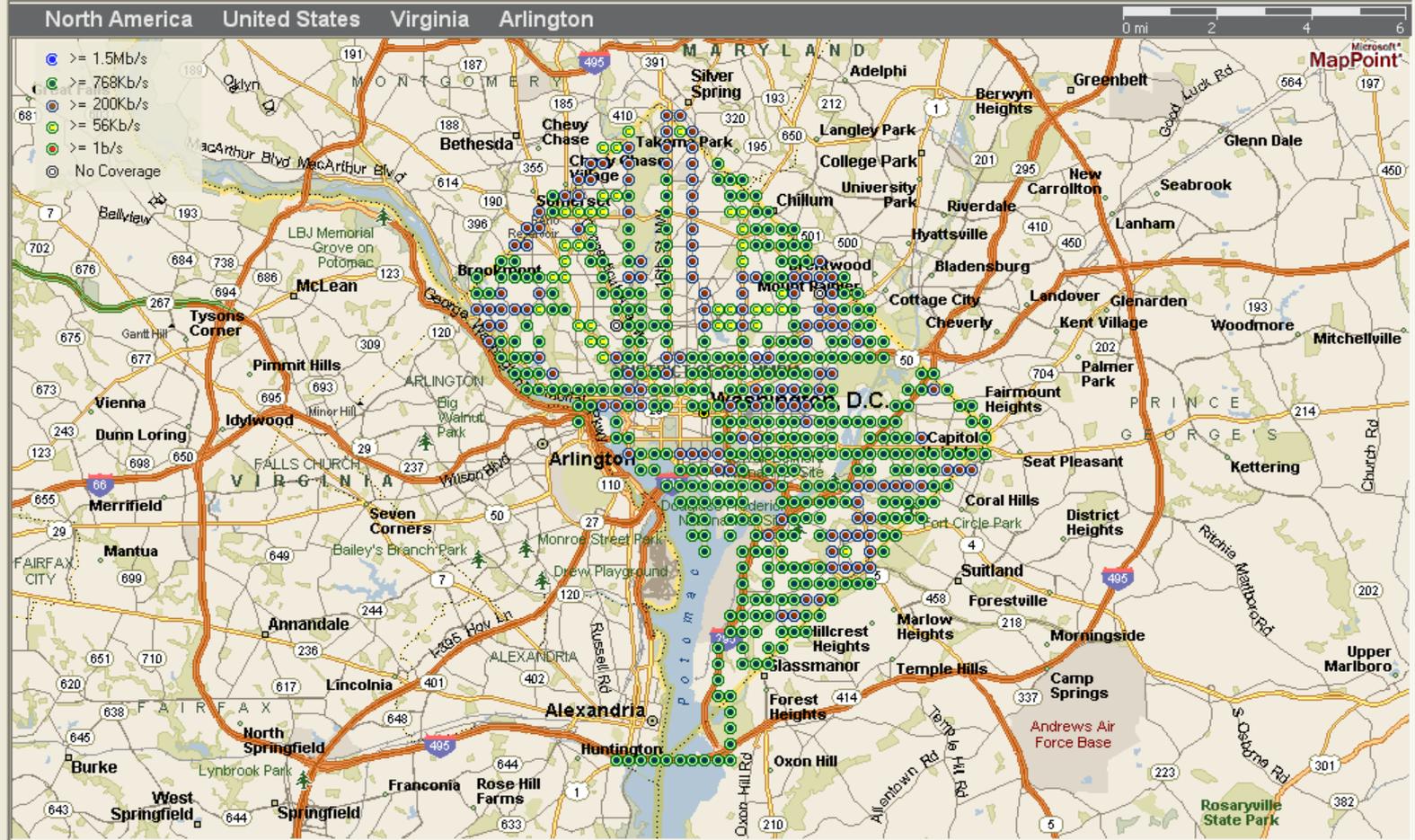
Show Data For: Bandwidth [v]
 Direction: Upload [v]

Data Filter

Medium: EVDO [v]
 Network/SSID: PANTECH UM17 [v]

Location ID

Show All [x]
 No Coverage [x]
 Unknown [x]



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: GPRS/3G

Network/SSID: AT&T

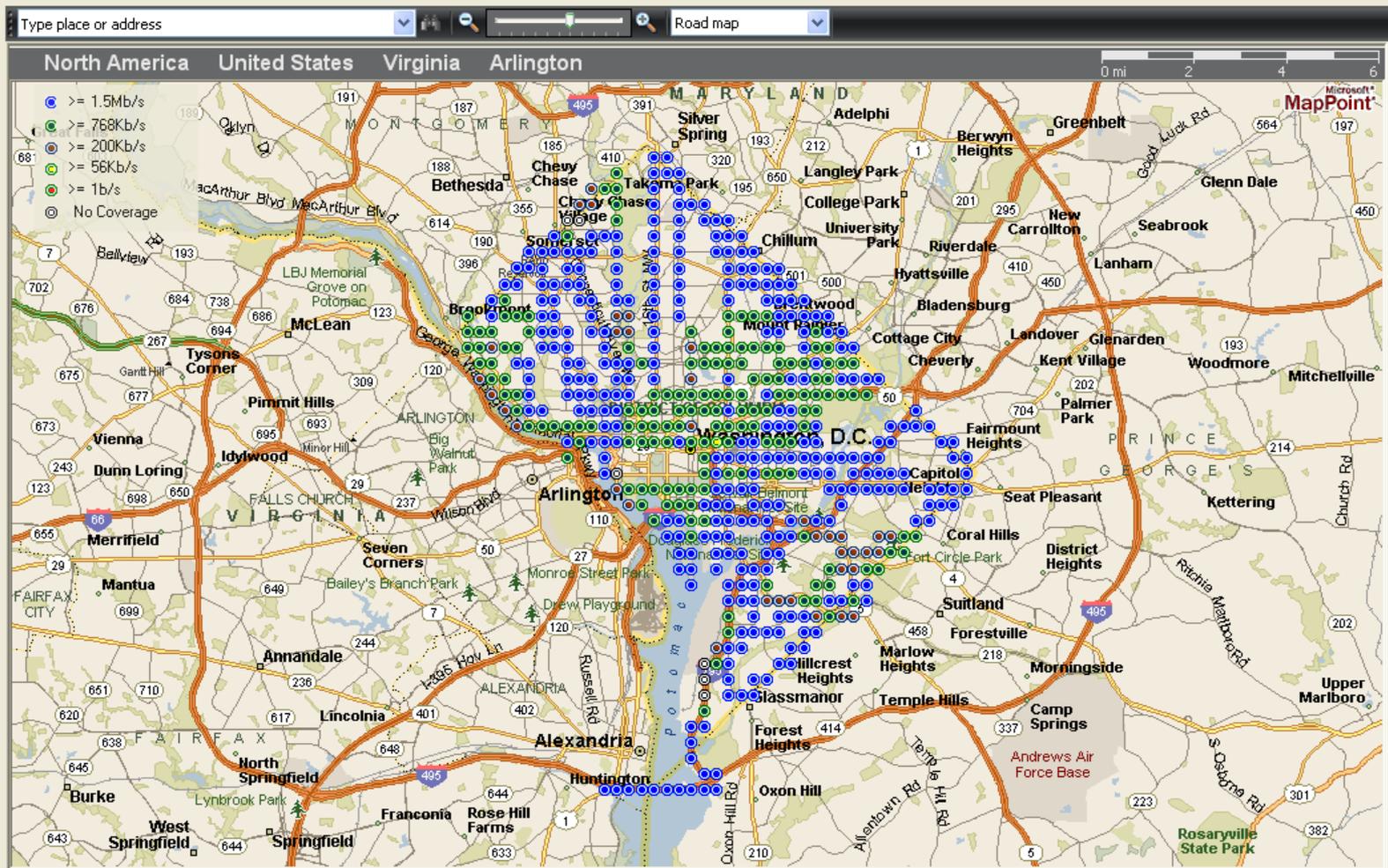
Location ID

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

Type place or address Road map

GPS Trace Data

Show Data For: Bandwidth

Direction: Upload

Data Filter

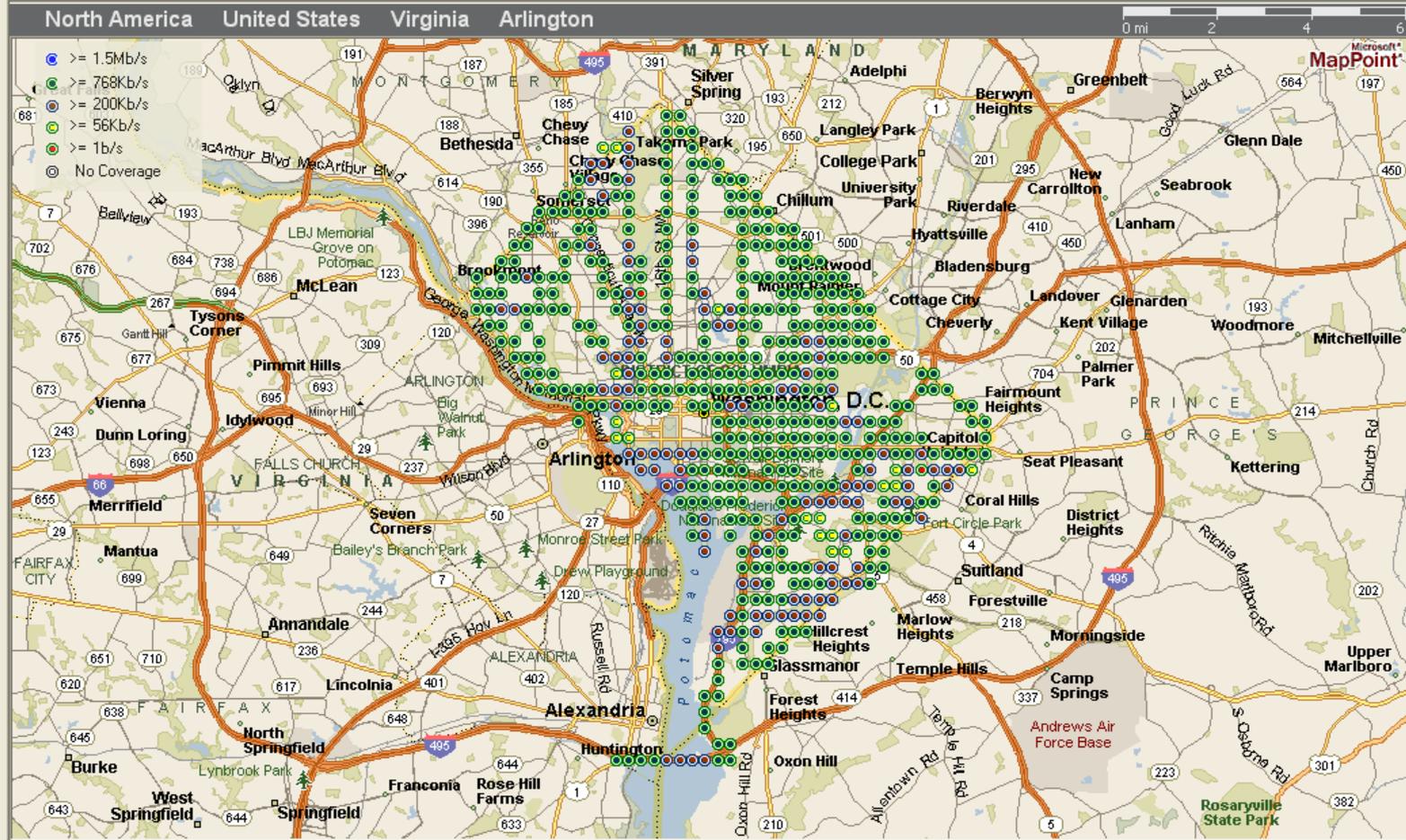
Medium: EVDO

Network/SSID: CRICKET

Location ID

- Show All
- No Coverage
- Unknown

Zoom to Selection



Reconnect

GPS Trace Data

Show Data For:

Direction:

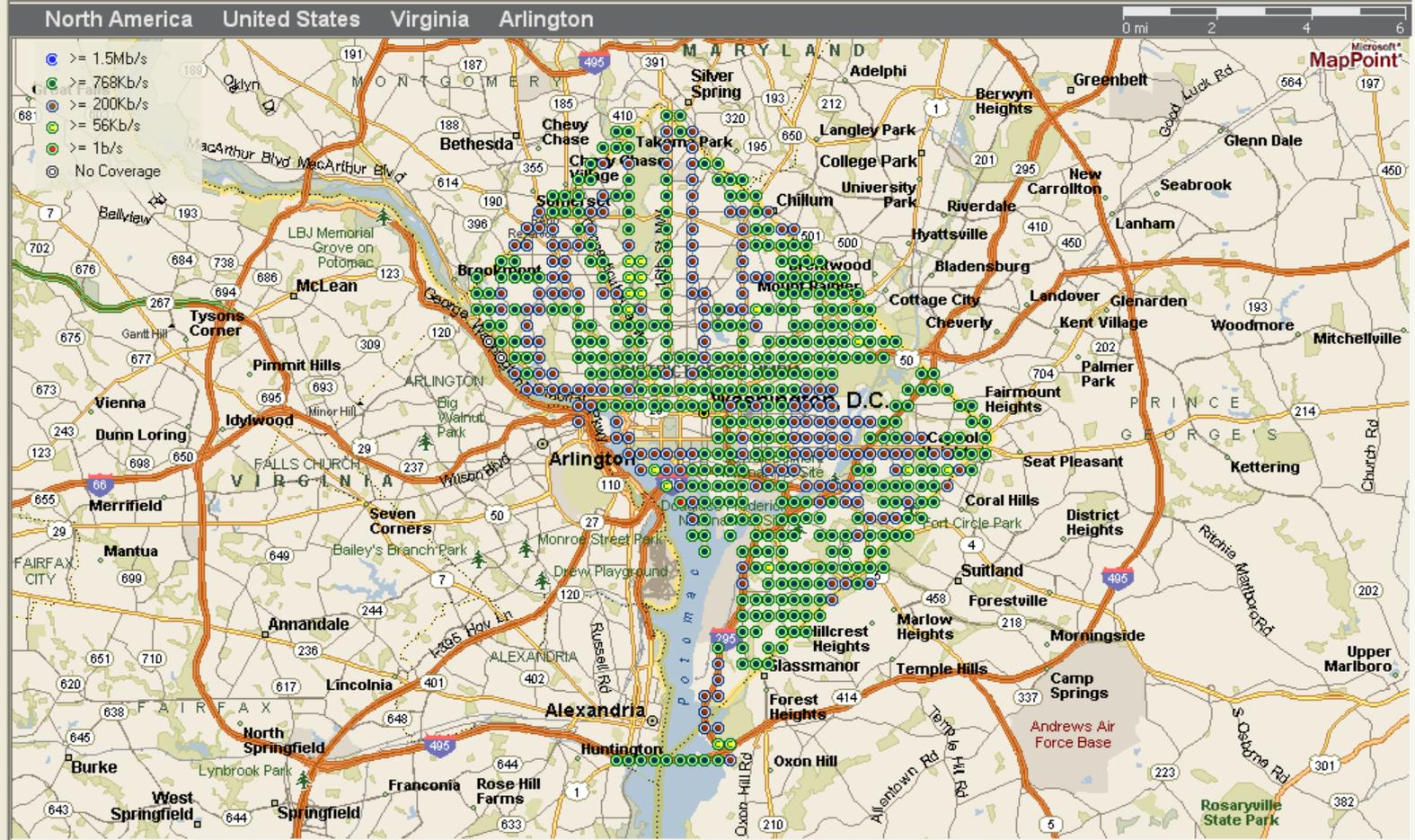
Data Filter

Medium:

Network/SSID:

- Location ID**
- Show All
- B44F-EC7E
 - B471-38EB52F
 - B471-38EEC06
 - B471-38EEC68
 - B471-38EEEC3
 - B471-38EEF9D
 - B471-38EF107
 - B471-38EFA17
 - B471-38EFC00
 - B473-2629D63
 - B473-262EE49
 - B475-136EA49
 - B475-136EB0D
 - B475-136EC38
 - B475-136EC39
 - B475-136CED
 - B475-136EDAA
 - B475-136EDB5
 - B475-136EDC7
 - B475-136EE41
 - B475-136F07A
 - B475-136F07B
 - B475-136F19D
 - B476-D2EAC7
 - B454 FCOB
 - B457 EB02
 - B457 EBA2
 - B457 F10F

Zoom to Selection



Reconnect