INDUSTRY BRIEF

Evolving Metrics:
New Levels of Accuracy Reveal Increased Take Rates

November 2009

Document Objective

This document describes the methodology and sources used in calculating a more current and accurate "Take Rate" for broadband in the United States, resulting in an increase over previous calculations.

Background

Thanks to funding through a variety of sources – the American Reinvestment and Recovery Act (ARRA), Broadband Stimulus under the BTOP, and BIP programs offered by the NTIA and USDA Rural Utilities Service (RUS) programs – much attention has been focused on broadband penetration, take rates and adoption rates in the United States. Recent round-one RUS program applications required broadband details, but a lack of information has limited both the availability of comprehensive data and overall study of the issue.

For years, the Federal Communications Commission (FCC) has collected data from broadband Internet providers using their Form 477. This information indicates the number of customers, broadband speeds, pricing and whether customers are residential or business class. Data had been tabulated at the Zip™ code level, but the collection process was recently modified to provide results at the Census Tract level instead.

Given access to this comprehensive database of information, it would be possible to determine broadband availability to a reasonable level of geographic accuracy. Unfortunately, access on a granular level outside of the FCC is not permitted, due in large part to agreements struck with the carriers to ensure their most important data assets would be protected from disclosure to competitors.

Existing Resources

Each year, the FCC releases a report [1]to Congress called "The State of Broadband in the US." The information in this report is provided at a state level, and has been used to tabulate broadband penetration rates. The calculation is determined by dividing the total number of reported residential subscriber lines by the total households reported [2]for the same time period in each state, resulting in a take rate for the state as a whole.

While this approach provides good directional information at macro levels, it does not provide the much-needed broadband penetration rates required for analysis of *only the areas where broadband services are deployed.*

In August of 2009, Brian Webster Consulting teamed with data provider Gadberry Group to design and prototype a method that would provide near address-level precision for broadband consumption and take rates. In the paragraphs that follow, we will describe what we believe to be the most accurate method possible to quantify take rates at micro levels of geography.

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[1] High-Speed Services for Internet Access: Status as of June 30, 2008 www.fcc.gov/wcb/stats

[2] http://www.census.gov/popest/housing/HU-EST2008-4.html

Data Sources

Three sources of data were used as primary information for the take rate model:

- FCC Report to Congress "High Speed Services for Internet Access: Status as of June 30, 2008"
- Census Bureau Annual Estimate of Housing Units for Counties
- Gadberry's Broadband Served Indicator Data

FCC Data

Each year, the FCC releases a report [3]to Congress called "The State of Broadband in the US." The information in this report is provided at a state-level only.

Census Data

The Population Estimates Program publishes total resident population estimates and demographic components of change (births, deaths and migration) each year. It also publishes estimates by demographic characteristics (age, sex, race and Hispanic origin) for the nation, individual states and counties.

In addition to the resident population universe, the census bureau also produces population estimates for these universes: resident plus armed forces overseas, civilian, civilian non-institutionalized at the national level, and civilian at the state level. The reference date for estimates is July 1. Estimates usually are for the present and the past, while projections are estimates of the population for future dates.

The program develops these estimates with the assistance of the Federal State Cooperative Program for Population Estimates (FSCPE). These estimates are used in federal funding allocations, as denominators for vital rates and per capita time series, as survey controls, and in monitoring recent demographic changes. With each new issue of July 1 estimates, revisions are made to estimates for years back to the last census. Previously published estimates are superseded and archived.

The Population Estimates are also available on American Factfinder.

Broadband Indicator Data

Gadberry's Broadband Served Indicator Data provides demographic data specifically designed to satisfy the requirements of the Broadband Initiative Program, as a part of the American Recovery and Reinvestment Act of 2009.
The Broadband Indicator is created using self-reported consumer information including Internet registrations, survey cards, online surveys, registrations and marketing solicitations data. The source data is compiled monthly by the provider, and the Broadband Indicator is constructed quarterly. The current sample size is over 20 million household records containing information indicating broadband use.

[3] High-Speed Services for Internet Access: Status as of June 30, 2008 www.fcc.gov/wcb/stats

Take Rate Methodology

We began by quantifying the total number of households *with access* to broadband services. Using the broadband in-use data described above, census blocks with reported active broadband subscribers were identified, as well as the number of occupied household units in each block for 2008. When totaled, the number of households in these census blocks provided the number of homes *passed by broadband* services. There were no efforts to determine the type of technology, pricing or speed available.

Armed with this information, the number of active broadband *residential lines* for each state (as per the FCC report) was divided by the total households in the active BB census blocks. The result is an accurate penetration rate in the areas *where broadband services are known to be available,* as well as the census blocks where broadband is unavailable. Subtracting the total households with active broadband available from the total households for the state gave the final result of homes *without access* to broadband.

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While most will agree that many states have large geographic areas with no access to broadband services, examining the data in the table below reveals that the percentage of households without access is smaller than many estimated. Much of this variance is due to sociological behaviors and patterns of settlement over time.

The census block, from a geographic standpoint, will vary in size based on population (and subsequently households). In sparsely populated areas, a census block may contain a large land area but represent very few households. In a metropolitan area, on the other hand, a census block may be no larger than a city block but include many homes and/or multi-family dwelling units. So, even though it may appear on a map that large areas of a state lack access to broadband, the number and percentage of households might be small in comparison to the land area.

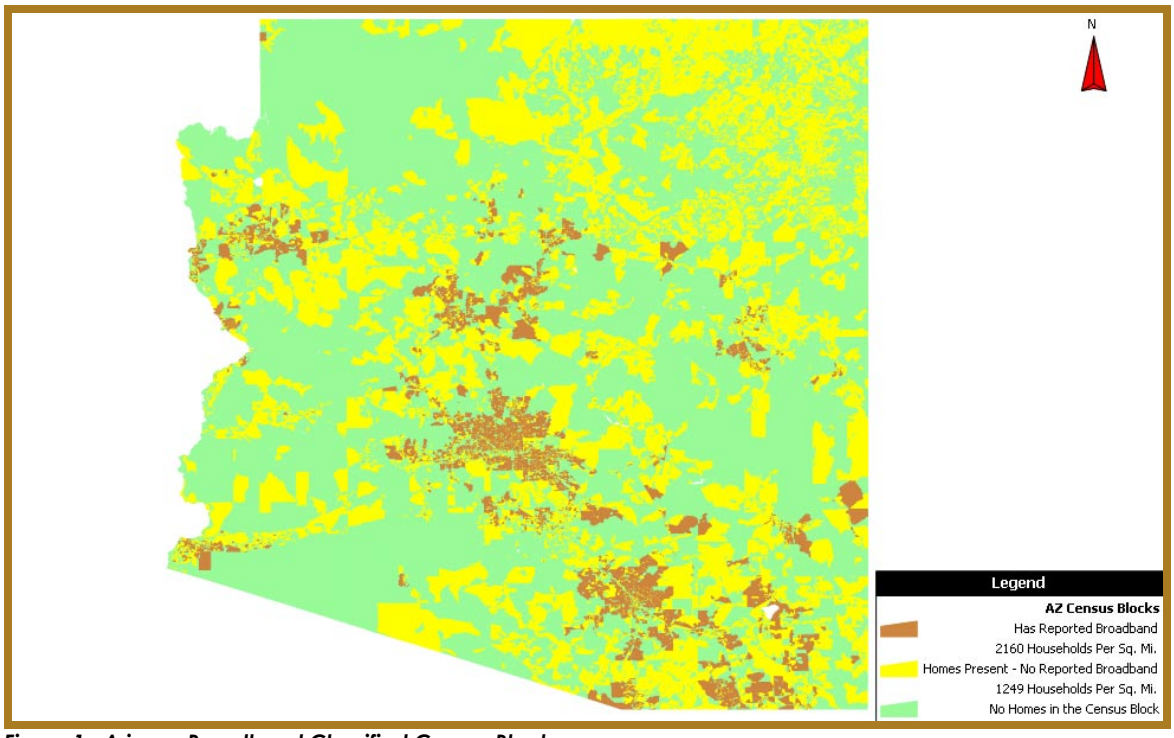

Figure 1: Arizona Broadband Classified Census Blocks

The image above for the state of Arizona shows a large amount of land area without reported broadband use. Yet, Arizona has a 75.13% adoption rate where broadband services are available. The take rate averaged over the whole state is 57.86%. Only 22.99% of the homes statewide do not have access to broadband.

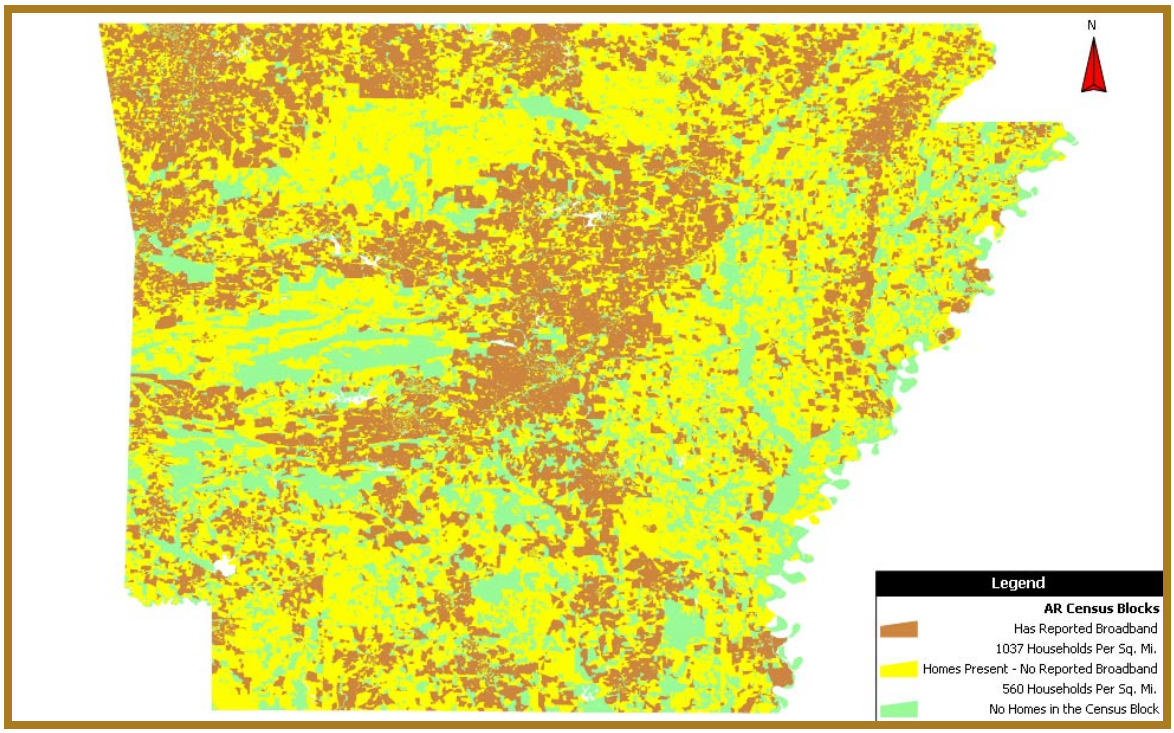

Figure 2: Arkansas Broadband Classified Census Blocks

State	Homes July 2008	2008 Broadband Res Lines	2008 Res Take Rate Statewide	Households with BB Available	Take Rate Where BB is Available	Difference Available to Statewide	Number of Homes Without Access to BB	% Homes without BB Access
AK	283,357	156,793	55.33%	175,379	89.40%	34.07%	107,978	38.11%
AL	2,158,576	909,945	42.15%	1,633,780	55.70%	13.54%	524,796	24.31%
AR	1,298,137	612,182	47.16%	927,961	65.97%	18.81%	370,176	28.52%
AZ	2,722,725	1,575,252	57.86%	2,096,738	75.13%	17.27%	625,987	22.99%
CA	13,393,878	10,406,479	77.70%	12,018,850	86.58%	8.89%	1,375,028	10.27%
CO	2,152,040	1,315,361	61.12%	1,743,132	75.46%	14.34%	408,908	19.00%
CT	1,443,115	1,135,798	78.70%	1,360,979	83.45%	4.75%	82,136	5.69%
DC	285,353	191,505	67.11%	243,435	78.67%	11.56%	41,918	14.69%
DE	392,965	240,153	61.11%	320,355	74.96%	13.85%	72,610	18.48%
FL	8,800,294	5,425,497	61.65%	7,120,733	76.19%	14.54%	1,679,561	19.09%
GA	4,026,082	2,402,283	59.67%	3,263,180	73.62%	13.95%	762,902	18.95%
HI	512,881	378,477	73.79%	394,369	95.97%	22.18%	118,512	23.11%
IA	1,329,352	632,294	47.56%	979,854	64.53%	16.97%	349,498	26.29%
ID	641,479	343,184	53.50%	454,827	75.45%	21.95%	186,652	29.10%
IL	5,276,979	3,471,815	65.79%	4,383,916	79.19%	13.40%	893,063	16.92%
IN	2,795,024	1,274,862	45.61%	2,207,438	57.75%	12.14%	587,586	21.02%
KS	1,226,859	721,808	58.83%	922,683	78.23%	19.40%	304,176	24.79%
KY	1,920,581	932,158	48.54%	1,531,031	60.88%	12.35%	389,550	20.28%
LA	1,883,167	1,111,304	59.01%	1,585,612	70.09%	11.07%	297,555	15.80%
MA	2,735,443	1,946,046	71.14%	2,491,976	78.09%	6.95%	243,467	8.90%
MD	2,333,064	1,767,213	75.75%	2,097,156	84.27%	8.52%	235,908	10.11%
ME	700,480	309,458	44.18%	463,399	66.78%	22.60%	237,081	33.85%
MI	4,535,323	2,262,822	49.89%	3,664,400	61.75%	11.86%	870,923	19.20%
MN	2,331,619	1,288,882	55.28%	1,811,539	71.15%	15.87%	520,080	22.31%
MO	2,663,977	1,496,075	56.16%	2,010,489	74.41%	18.25%	653,488	24.53%
MS	1,267,231	435,193	34.34%	931,606	46.71%	12.37%	335,625	26.48%
MT	438,282	198,534	45.30%	269,742	73.60%	28.30%	168,540	38.45%
NC	4,201,378	2,280,220	54.27%	3,386,502	67.33%	13.06%	814,876	19.40%
ND	313,332	145,593	46.47%	188,651	77.18%	30.71%	124,681	39.79%
NE	786,334	431,124	54.83%	562,337	76.67%	21.84%	223,997	28.49%
NH	597,129	363,328	60.85%	471,599	77.04%	16.20%	125,530	21.02%
NJ	3,517,293	2,716,982	77.25%	3,133,802	86.70%	9.45%	383,491	10.90%
NM	871,700	374,043	42.91%	564,196	66.30%	23.39%	307,504	35.28%
NV	1,127,061	780,141	69.22%	915,596	85.21%	15.99%	211,465	18.76%
NY	7,977,286	5,470,914	68.58%	6,988,378	78.29%	9.70%	988,908	12.40%
OH	5,079,873	2,838,688	55.88%	4,391,866	64.64%	8.75%	688,007	13.54%
OK	1,637,138	880,666	53.79%	1,154,522	76.28%	22.49%	482,616	29.48%
OR	1,628,826	1,081,837	66.42%	1,331,670	81.24%	14.82%	297,156	18.24%
PA	5,496,336	3,097,119	56.35%	4,563,812	67.86%	11.51%	932,524	16.97%
RI	451,753	297,643	65.89%	411,553	72.32%	6.44%	40,200	8.90%
SC	2,056,127	942,688	45.85%	1,578,466	59.72%	13.87%	477,661	23.23%
SD	361,482	170,380	47.13%	227,352	74.94%	27.81%	134,130	37.11%
TN	2,758,171	1,346,820	48.83%	2,327,985	57.85%	9.02%	430,186	15.60%
TX	9,598,579	6,198,779	64.58%	7,845,124	79.01%	14.43%	1,753,455	18.27%
UT	944,347	552,567	58.51%	774,276	71.37%	12.85%	170,071	18.01%
VA	3,306,389	1,900,624	57.48%	2,815,194	67.51%	10.03%	491,195	14.86%
VT	312,617	136,780	43.75%	205,400	66.59%	22.84%	107,217	34.30%
WA	2,791,597	1,783,539	63.89%	2,344,684	76.07%	12.18%	446,913	16.01%
WI	2,569,430	1,384,836	53.90%	2,041,611	67.83%	13.93%	527,819	20.54%
WV	886,430	314,072	35.43%	471,193	66.65%	31.22%	415,237	46.84%
WY	246,393	116,661	47.35%	146,697	79.53%	32.18%	99,696	40.46%
Totals	**129,065,264**	**78,547,417**	**60.86%**	**105,947,025**	**72.90%**	**12.05%**	**23,118,239**	**17.91%**

Table 1: Comparison of Broadband Take Rates by State

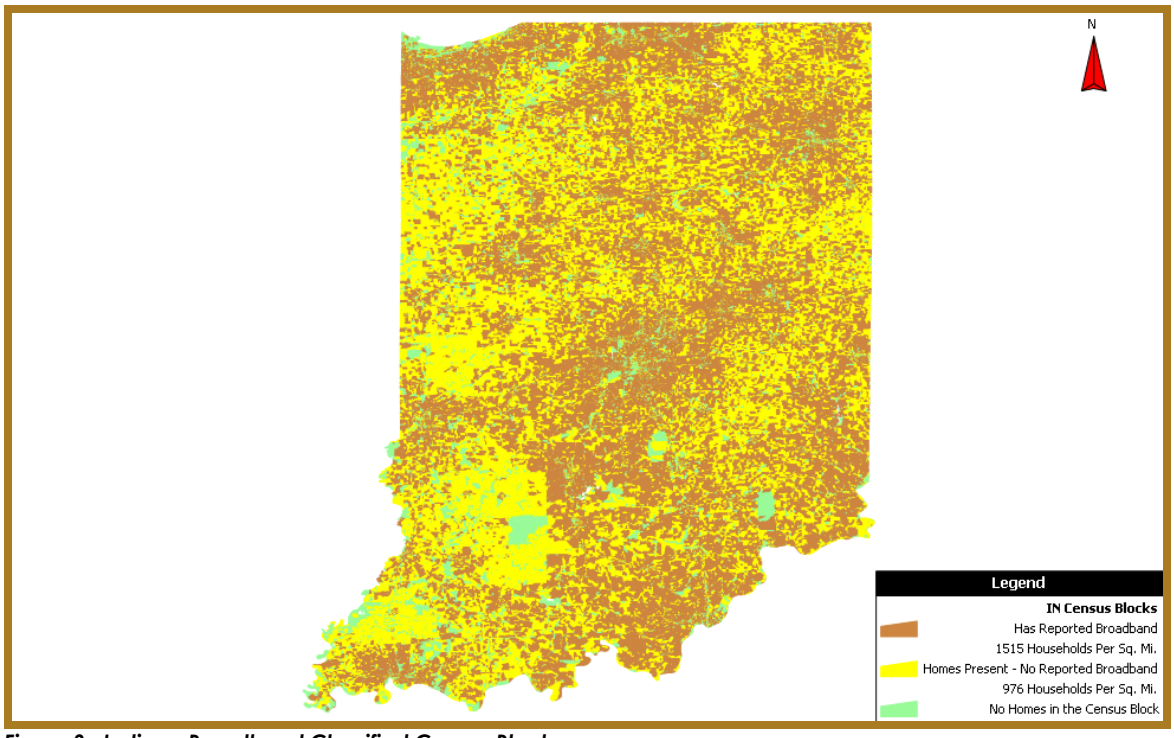

Figure 3: Indiana Broadband Classified Census Blocks

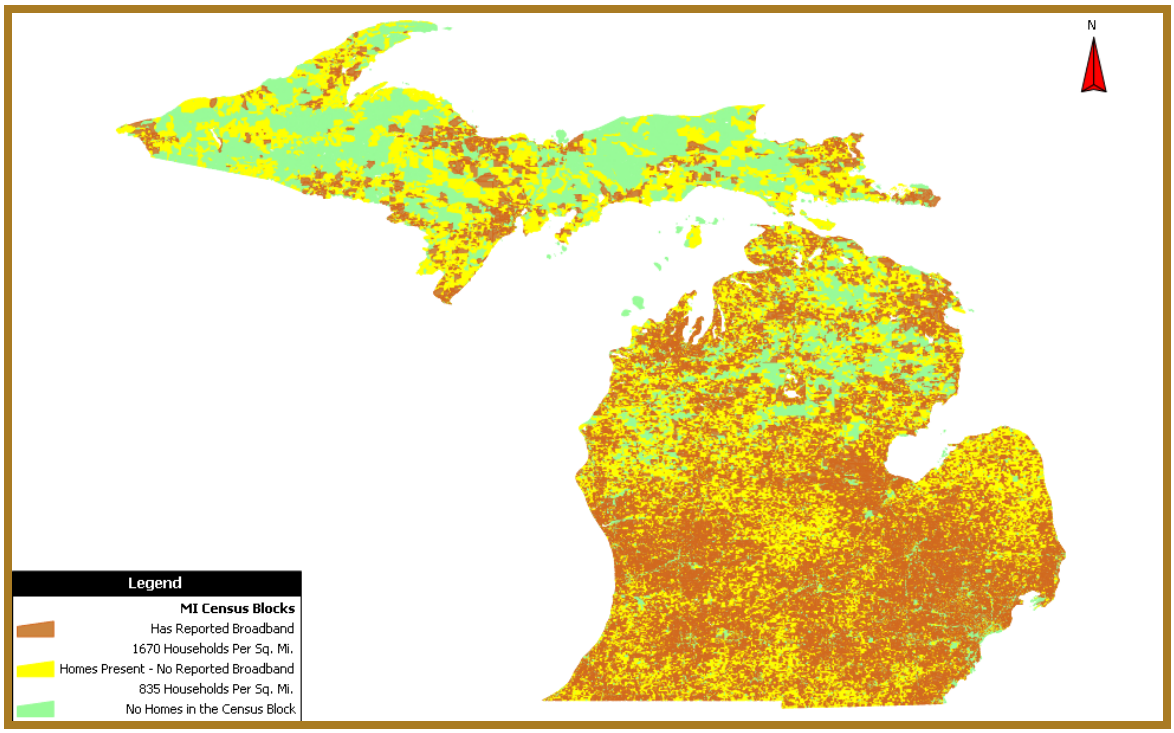

Figure 4: Michigan Broadband Classified Census Blocks

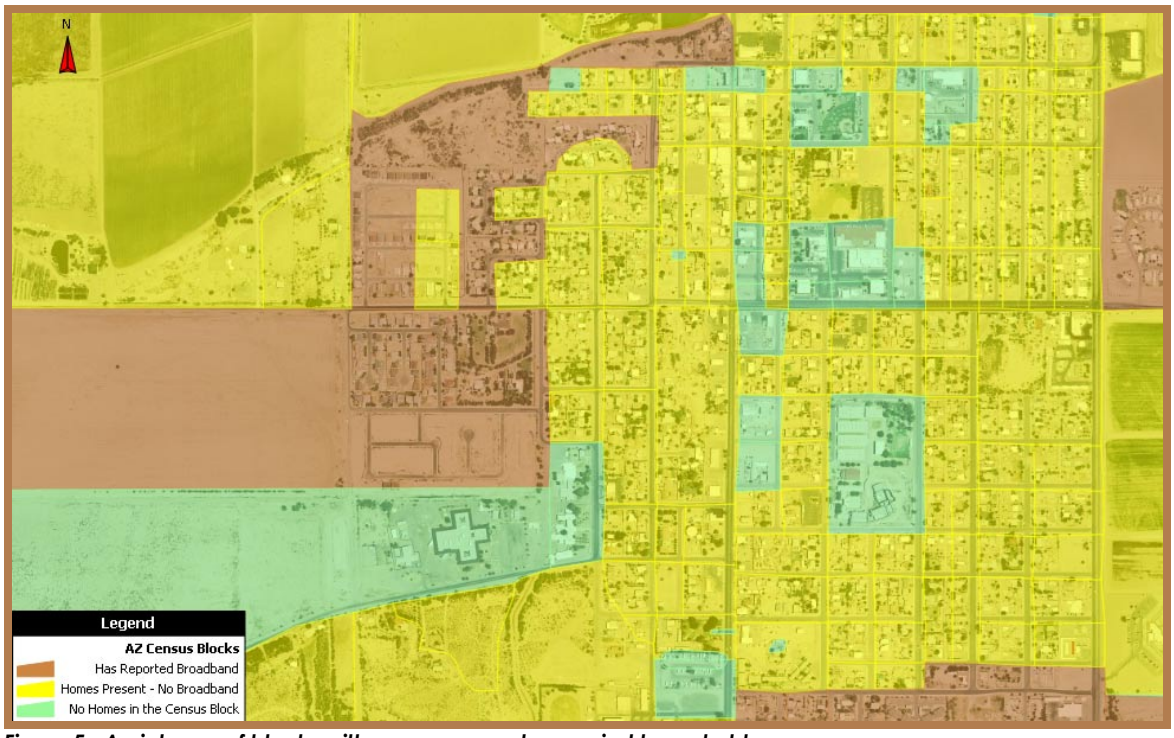

Figure 5: Aerial map of blocks with no access and occupied households.

Conclusion

Using the approach described in this document, the estimate of the national broadband adoption rate where services are available stands at 72.9%. The total number of homes with access to broadband is 105,947,025. The number of homes that *do not have access* to broadband is 23,118,239, which represents 17.91% of currently occupied homes (based on 2008 estimates). When compared to the current accepted industry estimates, the new approach results in a 10% increase in previously quoted adoption rates.

Based on these higher adoption rates, it is now possible to reevaluate additional broadband deployments or expansions to areas that might not have been considered financially sustainable previously, based on their low household density per square mile. Armed with more accurate data and the ability to identify *exactly where* unserved homes are located allows for more informed deployment strategies, and possibly more served households.

Broadband Estimates Calculated with New, More Accurate Metrics

- National broadband adoption rate where services are available: **72.9%**
- Total number of homes with access to broadband: **105,947,025**
- Number of homes without access to broadband: **23,118,239**
- Percentage of homes without access to broadband: **17.91%**

Purpose of Brief

This brief is not intended to go into high-level detail regarding speed, pricing or type of technology/topology deployed, nor is it intended to quantify the ranking of the US in worldwide broadband adoption rates. The Berkman Center recently published a report for the FCC with those details, available at http://www.fcc.gov/stage/pdf/Berkman_Center_Broadband_Study_13Oct09.pdf.

Rather, the primary focus of this brief is to identify the potential broadband market as a whole. Take rate statistics have a major impact in forecasting the financial viability and sustainability for private sector broadband networks. To date, most models assume a much lower adoption rate, which could make a difference in decisions to deploy broadband in the remaining unserved markets.

About Brian Webster Consulting

Brian Webster Consulting and wirelessmapping.com were created to fill a need for affordable wireless engineering services for those unable to justify the cost of hiring and maintaining fulltime RF Engineering staff. Projects are approached with a creative eye, cost-conscious methodology and nearly 20 years of industry experience. The integration of Geographic Information Systems (GIS) helps present complex engineering and demographic information in clear, color diagrams that help the end user make actionable business decisions. These capabilities allow demographic data and market analysis information to be included as overlays to a client's engineering diagrams, along with raw data for input to financial models.

Brian has extensive experience in municipal wireless (Muni) network design. Most recently, he was an RF Engineering Manager at EarthLink and was responsible for designing the City of Philadelphia's municipal wireless network, one of the world's largest wireless mesh deployments. His responsibilities included reviewing and approving the work of EarthLink engineers and Motorola contractors.
http://www.wirelessmapping.com/

About The Gadberry Group

The Gadberry Group provides location-based services and information data products for clients who demand the most current, accurate and precise household and population data for their site location analysis. MicroBuild®, Gadberry's patent-pending product, is unique because only MicroBuild® uses consumer data at the rooftop level to deliver quarterly household and population counts beginning at the census block level.
http://www.gadberry.net/