



# **The Geographic Key to Broadband Stimulus Funding**

A Whitepaper on GIS and Planning Wireless Broadband Networks

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**Summary:**

This whitepaper makes the case for how the expansion of Broadband service, in particular Wireless Broadband Access (WBA), meets the goals of the 2009 “Stimulus Act” and how Afterimage GIS is a strategic and indispensable element in the planning and deployment of this service.

**Broadband expansion raises 4 questions:**

- Why do we need Broadband?
- Why will Wireless Broadband Access, WBA help us meet the goals of the 2009 “Stimulus Act?”
- How can we help make WBA a reality?
- How can we utilize stimulus funding for WBA effectively?

**Why do we need Broadband?**

Of the 30 member countries of the OECD, (Organization of Economic Cooperation and Development), the United States ranks 15<sup>th</sup> in broadband penetration<sup>i</sup>. And on Saturday radio address December 6<sup>th</sup> President Elect Obama said “It is unacceptable that the United States ranks 15th in the world in broadband adoption.”<sup>ii</sup> Why is this poor standing in the international technological league table a concern? It has become a conventional wisdom that broadband is critical to national infrastructure that positively affects businesses, consumers, health, education, communities and the economy in general. Outside the U S, 11 other industrialized nations are currently taking measures to invest in expanded broadband access as a means to revive shrinking economies. Charlie Davis a senior analyst at Ovum , a telecommunications consultancy notes “There’s this competition internationally to want to be there at the top and say, ‘We’re the most digitally advanced country, a great place to do business and all that.’”<sup>iii</sup>

Broadband can provide a wide range of technical capabilities to access valuable resources, services, and products strategic to the quality of life.

- **Education, Culture, & Entertainment**
  - Broadband can overcome geographical and financial barriers to provide access to a wide range of educational, cultural, and recreational opportunities and resources.
- **Telehealth & Telemedicine**
  - Broadband can facilitate provision of medical care to unserved and underserved populations through remote diagnosis, treatment, monitoring, and consultations with specialists. And as federal healthcare reform plans to computerize all healthcare records comes on stream all hospitals and healthcare facilities will have to be broadband network connected.
- **Economic Development/E-Commerce**
  - Broadband can promote economic development and revitalization through electronic commerce (e-commerce) by:
    - Creating new jobs and attracting new industries.
    - Providing access to regional, national, and worldwide markets.
- **Electronic Government (E-Government)**
  - Electronic government can help streamline people’s interaction with government agencies, and provide information about government policies, procedures, benefits, and programs.

- **Public Safety and Homeland Security**
  - Broadband can help protect the public by facilitating and promoting public safety information and procedures, including, but not limited to:
    - Early warning/public alert systems and disaster preparation programs.
    - Remote security monitoring and real time security background checks.
    - Backup systems for public safety communications networks.
- **Broadband Communications Services**
  - Broadband provides access to new telecommunications technologies such as Voice Over Internet Protocol (VoIP) allowing voice communication using the Internet.
- **Communications Services for People With Disabilities**
  - Broadband permits users of Telecommunications Relay Services (TRS) to use Video Relay Services (VRS) to communicate more easily, quickly, and expressively with voice telephone users.

### **Why will Wireless Broadband Access, WBA help us meet the goals of the 2009 “Stimulus Act?”**

The purpose of the Stimulus Act is to jumpstart the economy and create jobs through short term funding of infrastructure projects. It is believed that investment in broadband will create jobs needed for build out and so stimulate short term growth but also long term growth through multipliers resulting from expanded telecom infrastructure. The stimulus act allocates funds for the establishment of the Broadband Technology Opportunities Program (BTOP) that will provide grants for broadband deployment “in areas that are currently ‘unserved’ and ‘underserved’ and encourage sustainable broadband adoption in low income communities.”<sup>iv</sup> The former are, of course, almost exclusively in low density rural areas, hitherto neglected by ISP’s because the ROI per network mile for wireline deployment is so low. Federal funds would compensate for this lack of profitability. Hence the rationale for placing part of the broadband stimulus funds under the aegis of the Rural Utilities Service of USDA.

Discussion within the Obama team, following the signing of the Stimulus act, has opened up the possible dilemma of a cyber-bridge to nowhere. Wireline deployment, principally FTTH is job creation intensive but costly in relation to the number subscribers reached. Investment must be balanced. As Blair Levin White House tech team advisor has said, “ if one proposal costs \$100 million and creates 10,000 jobs, but only connects three people, and the other one costs \$200 million, a few less jobs, but connects a million people, you probably want the latter.”<sup>v</sup> When matched against wireline deployment costs, WBA whether WiMAX or LTE (coming on stream in 2010) offers advantages of scalability, quicker ROI, lower installation costs, faster deployment and lower operation costs.

Wireless will create fewer jobs than wireline in the short term but cannot only be deployed profitably in small and low density markets but also in the long term save communities from depopulation and economic decline. An eloquent example of salvaging rural economic and community stability is the case of Scottsburg, Indiana [http://www.alvarion.com/upload/contents/291/alv\\_cs\\_Scottsburg\\_LR.pdf](http://www.alvarion.com/upload/contents/291/alv_cs_Scottsburg_LR.pdf)<sup>vi</sup>.

### How can we help make WBA a reality?

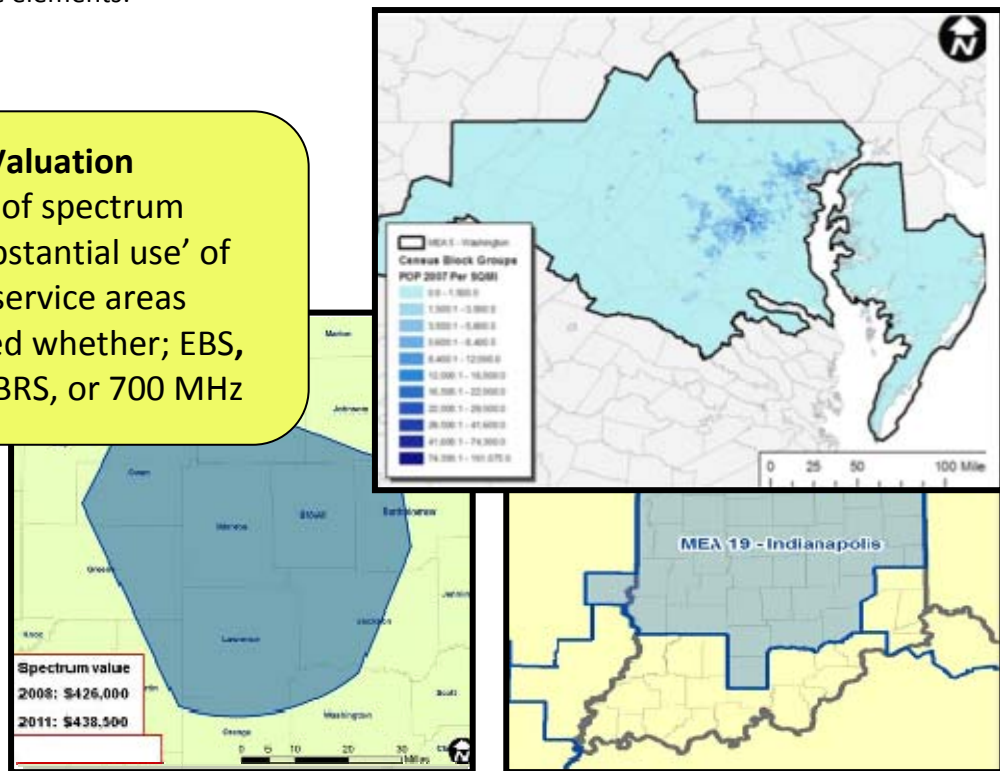
Wireless broadband deployment requires choice of 3 fundamental commercial players:

- The manufacturer of antennas and base station equipment
- The company that will install and field test the hardware
- The company that will, on a market by market basis, delineate ‘unserved’ and ‘underserved’ market geography, derive optimal wireless network plans to reach unserved markets based on available/planned vertical real estate, and measure ROI based on numbers and income levels of predicted consumers cross tabulated with signal strength forecasted through precise RF GIS modeling.

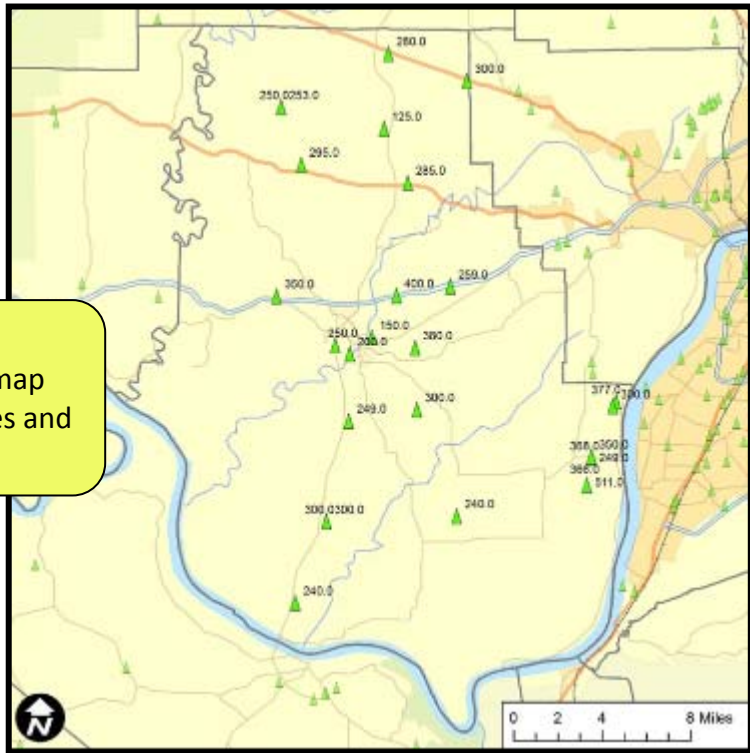
Afterimage GIS is one of the top companies in the world that accomplishes the third of the above roles, and, to coin a favorite Obama metaphor is the ‘third leg of the stool’ key and indispensable to any deployment project. Given wireline backbone configuration Afterimage can plan prepare a radio frequency RF network plan (incorporating point of presence and microwave backhaul by line of sight) that targets prequalified consumers based upon accurate modeling of RF strength as layered on top of mapped households, businesses and public institutions whose purchasing habits and demographic attributes are linked via a relational data base. This also means that an ISP client of our RF network plan can, say, type in the name and address of a prequalified broadband customer and determine a) whether acceptable service is available, and b) whether that service will require indoor or outdoor service equipment. Afterimage will also set up for the ISP client ‘back office’ customer service maintenance coupled with periodic upgrades of the RF network plan as demographics and ground clutter obstruction impacts on signal footprints change.

Put graphically Afterimage can bring WBA to ‘unserved’ and ‘underserved’ areas of America through the following service elements:

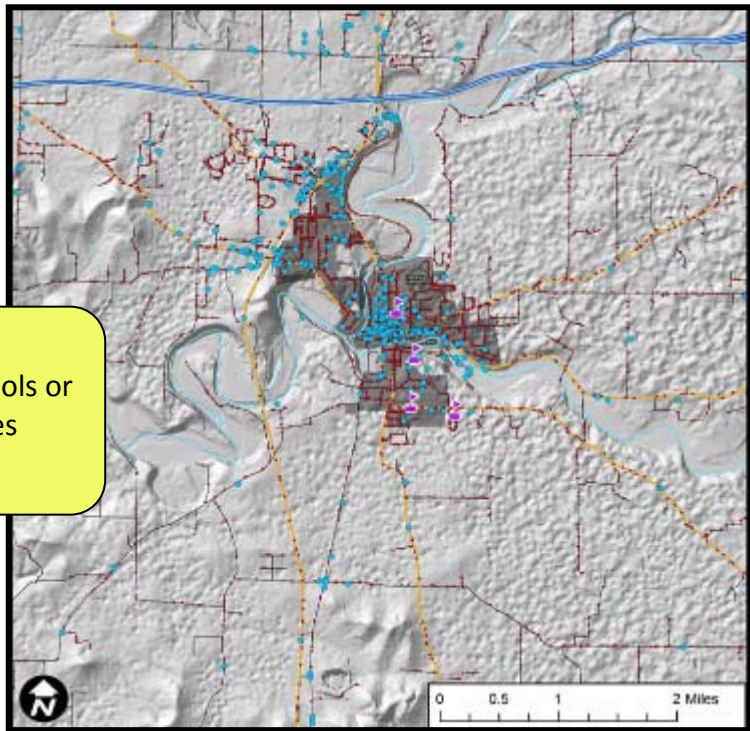
**Frequency Valuation**  
 Assessment of spectrum value or ‘substantial use’ of geographic service areas (GSAs) served whether; EBS, WCS, AWS, BRS, or 700 MHz



**CURRENT INFRASTRUCTURE**  
After delineating market area map towers, fiber, DSL central offices and cable footprints

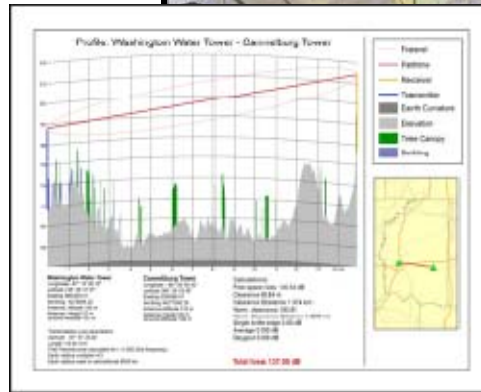
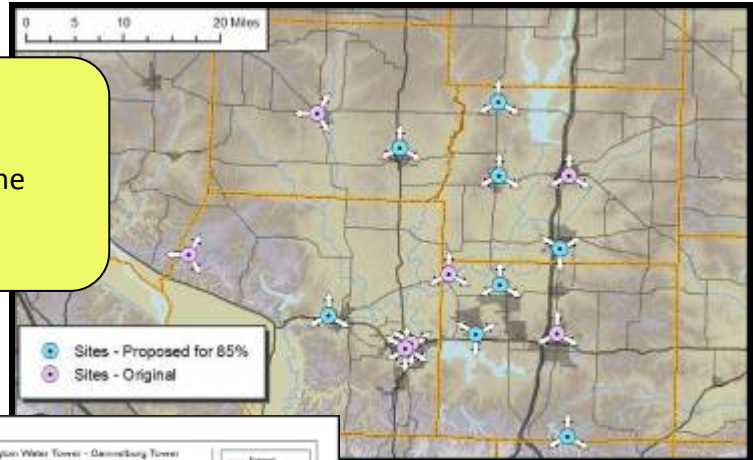


**MARKET IDENTIFY**  
Map household, business, schools or other anchor tenant possibilities



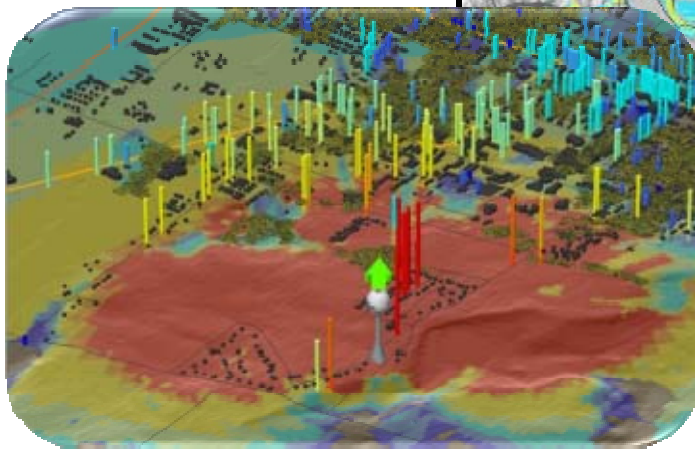
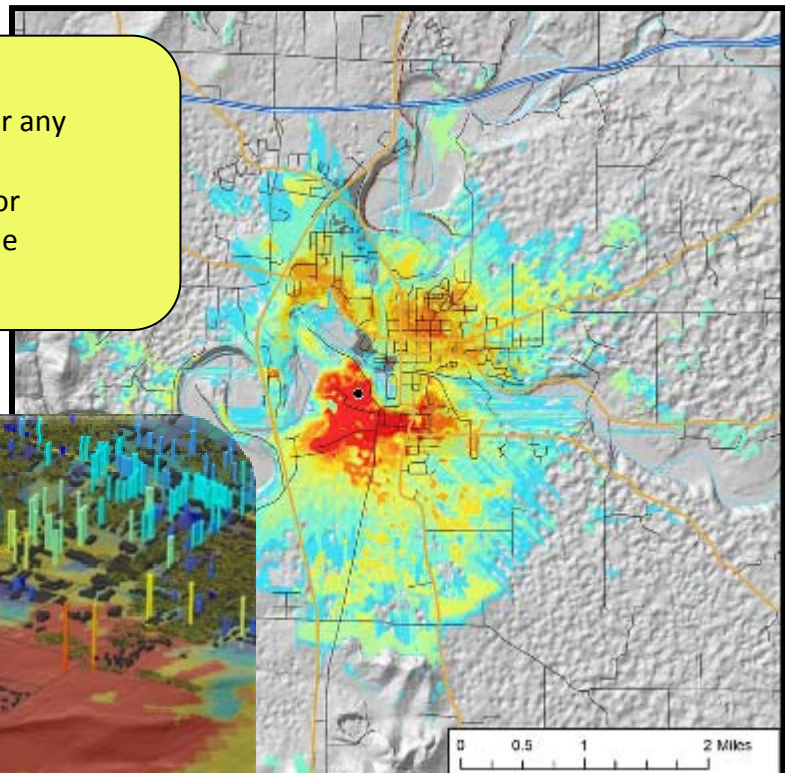
**NETWORK DESIGN**

- Select sites and configure equipment to best serve the delineated markets
- Microwave Backhaul



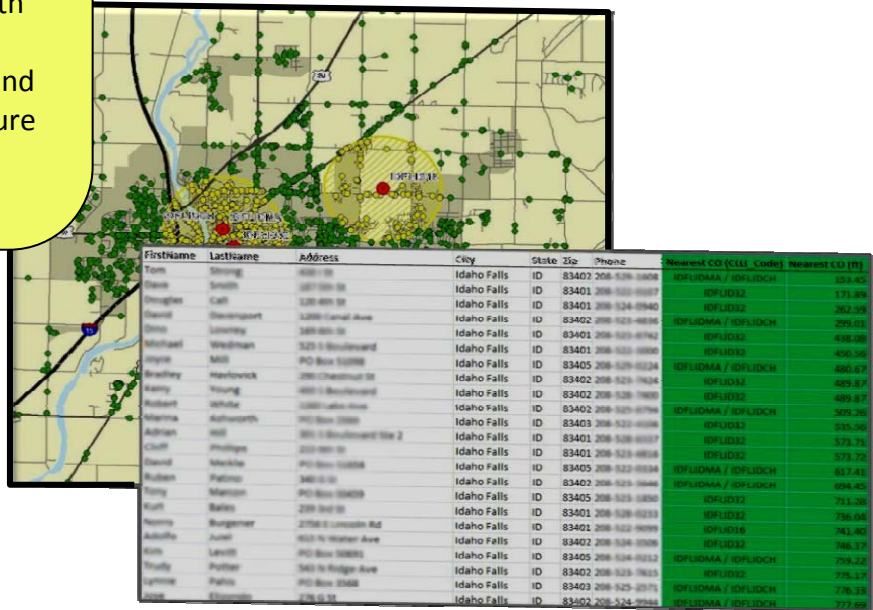
**PREDICTED COVERAGE**

- Coverage estimates for any frequency/technology
- Accurate calculation for indoor/outdoor/mobile customer equipment



**Marketing Plan**

- Determine who will be served and the level of service that can be expected at each address
- Increase success rate with ability to target a marketing, give names and addresses and expenditure data on prequalified customers



**How can we utilize stimulus funding for WBA effectively?**

Using GIS integrated with advanced RF modeling software, effectiveness of funding can be maximized in the following ways:

- Overall cost savings derived from RF network planning
- Accuracy of RF planning that assures ROI
- Fast turnaround of R F planning delivering quick return on investment
- Scalability of RF planning that is nimble and flexible to ISP needs

Overall savings.

Because of the huge CAPEX of WBA deployment, telecommunications providers need access to the most accurate data and reliable methods possible of network planning now more than ever. The stakes are too high and investment in infrastructure has grown too costly to not get it right the first time. The top reason for using Afterimage’s services for RF network planning is that huge cost savings are incurred over the strategy physically trying out alternative deployments, climbing towers, hanging hardware and field testing till an optimal, or more likely a minimally satisfactory solution is found.

Two past examples illustrate the importance of accurate data and network planning. In Philadelphia, Pennsylvania, a business plan by Wireless Philadelphia presented costs for building the wireless network that were grossly underestimated. The actual cost to the city for the project was more than double the original estimates<sup>vii</sup>. Similarly, a wireless network pilot project in Seattle, Washington was shut down five months after it was initiated because trees were interfering with the WiFi signals<sup>viii</sup>. These failures arose from the inability to effectively predict where signal could be received and at what strength without the huge cost of, in the field, trial and error of different antenna configurations and test driving of the result. Utilizing the tools described within this document, it may have been possible to avoid what took place in Philadelphia.

### Accuracy

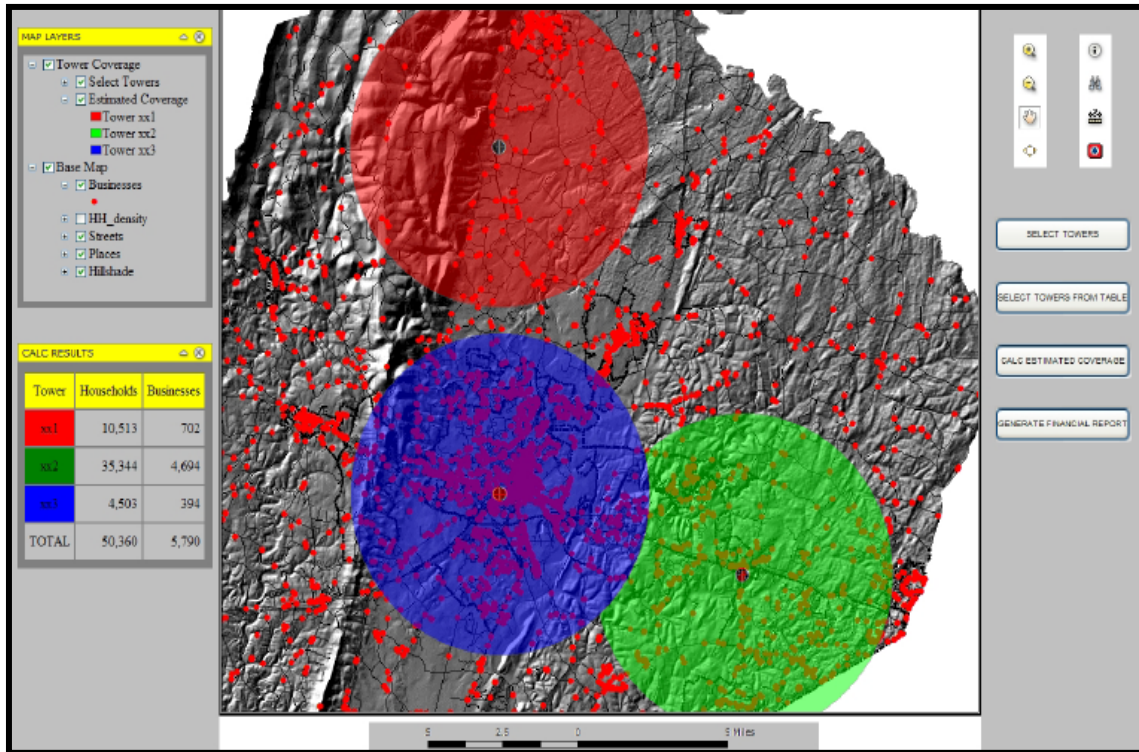
Original ground breaking work for Ball State University on 2.5Ghz and 3.5Ghz, and subsequent accumulated experience with diverse client circumstance, Afterimage GIS has accumulated and refined knowledge and technique enabling the delivery of very high accuracy. In technical terms Afterimage's theoretical models match up within 6db of real world readings, and as far as percentage (predicted signal strength against actual), accuracy comes in very high. Afterimage also routinely performs audits on their models by surveying clients' customers after installations have taken place, thus refining the models and further increasing accuracy. Accordingly clients can conduct a virtual testing of many scenarios in the "office" before actual deployment, while all along having the comfort of knowing that regardless of whatever solution is chosen, accuracy is assured.

### Fast turn around

Afterimage's national databases allow for a quick and nimble turnaround, the time spent by most competitors gathering the needed data for both engineering and marketing is thus obviated. From an engineering aspect the appropriate layers are already part of Afterimage's seamless process and the only actual gathering of data is market data, done on a case by case basis, ensuring the most up to date household and business addresses which funnel into their marketing campaign. What typically takes weeks or even months, Afterimage has cut down significantly, both due to refined processes, honed over the past several years, and the accumulation of databases that allow for quick turnaround time.

### Scalability of RF planning

It is a given that ISP's engaged in wireless deployment range from small local less capitalized providers working with unlicensed frequency to the highly capitalized companies owning or leasing licensed frequencies operating nationwide. Clients' needs for market feasibility assessment will therefore vary from a 'stripped down look see' to a full blown RF planning product. For example, a client could specify the coordinates of their vertical real estate, or have us use our national database, Afterimage would use those coordinates within our household and business databases, lay out approximate RF from that tower which roughly approximates the footprint of signal strength from each tower and give the client a tabulation of the number of potential customers that could receive service. In this way a client will be able to define a geographic area of interest and determine the number of towers required to cover the desired number of households and/or businesses by running a generalized model. This service would give a very preliminary 'first look' overview designed to intrigue and raise interest in possible in-depth modeling products from the company.



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## End Notes

<sup>i</sup> Om Malik, **GIGAOM**, May 20 2008

<sup>ii</sup> Dan O'Shea, **FierceTelecom**, December 8, 2008

<sup>iii</sup> Eric Pfanner, **International Herald Tribune**, February 26, 2009

<sup>iv</sup> S. Derek Turner, **Putting the Angels in the Details: A Roadmap for Broadband Stimulus Success**, freepress, February 2009

<sup>v</sup> John Eggerton, **Multichannel News**, February 26, 2009

<sup>vi</sup> [http://www.alvarion.com/upload/contents/291/alv\\_cs\\_Scottsburg\\_LR.pdf](http://www.alvarion.com/upload/contents/291/alv_cs_Scottsburg_LR.pdf)

<sup>vii</sup> Sonina Matteo, **NETWORK WORLD**, March 3, 2008

<sup>viii</sup> Tricia Duryee, **The Seattle Times**, October 13, 2005