# U.S. CELLULAR

## USF MOBILE BROADBAND MODEL

### MODEL METHODS AND OUTPUT

June 10, 2011

Presented by U.S. Cellular

# Introduction



The **U.S. Cellular Mobile Broadband Cost Model** presents various scenarios that provide insight into what costs and funding might be if the FCC adopts a Forward Looking Economic Cost model to calculate costs and support for mobile carriers.

Four states have been selected to demonstrate the various cost and support scenarios across U.S. Cellular's service territories. The output includes data from **Maine, Nebraska, West Virginia and Wisconsin.**

***This presentation is a preliminary look at the results. The data shown here represent a "beta" model and report.***

# Purpose

The purpose of this model is to estimate the cost to serve areas (and users) not presently serviced with 4G wireless broadband technology, determine commercial viability, and identify areas in need of additional funding support. The high level methodology used in the modeling includes:

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- Determination of where 4G wireless coverage is available
- Identification of existing assets that can be leveraged to provide 4G coverage
- Analysis of the area requiring coverage and determination of what additional assets need to be deployed to provide 4G coverage
- Determination of the costs to maintain and operate the modeled network assets, service the customers, and support commercial business operations
- Assessment of whether a service area is commercially viable (i.e., can operate at a positive contribution margin) or is in need of additional support (i.e., would operate at a negative contribution margin)
- '4G' coverage is defined as the ability to receive one of two types of OFDM service or HSPA+. If an area had no '4G' service, the area was categorized as unserved by '4G' and the area was augmented from existing 2G or 3G infrastructure (if available) or built as a 'greenfield' site.

*This study is not an attempt at creating an actual final cost or a precise tower count necessary for building and operating a 4G wireless network. Rather, the authors view this model as the first of many steps in accurately identifying locations, investments, operating costs, and potential subsidies related to support of ubiquitous 4G wireless broadband coverage.*

# Methodology

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**Coverage Determination** – Utilizing industry service data on wireless network deployments as of the end of 2010, a determination was made regarding the extent of 4G wireless coverage in the jurisdictions modeled. The model was then used to develop results for those areas unserved by 4G technology within a jurisdiction. The model also developed results for all areas within a jurisdiction for comparative purpose.

American Roamer see www.americanroamer.com

# Methodology

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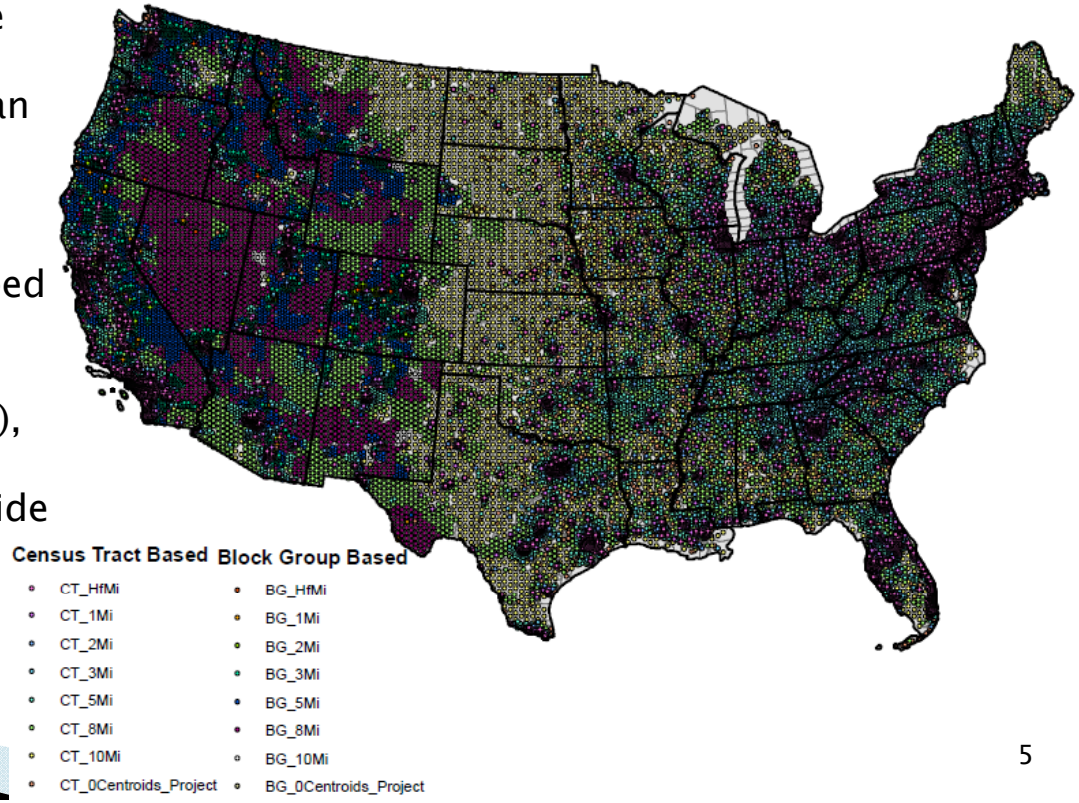
**Coverage Analysis** – Each modeled state jurisdiction was divided into areas approximating the coverage of a single wireless base station using spectrum currently available to commercial mobile radio service providers (cell coverage areas). These cell coverage areas (varying in size from less than one square mile to as much as 310 square miles) were superimposed over the targeted jurisdictional coverage area. Those cells without any population or roads were dropped from further analysis. It was assumed that new technology was needed in each of the remaining cells (those without any coverage), providing an estimated count of new technology investment sites needed to provide the desired 4G service coverage.



# Methodology

2

**Asset Analysis** – Existing U.S. Cellular assets (base station locations) were matched with cell coverage areas derived from the coverage analysis. In addition, in those cell coverage areas not served by U.S. Cellular but with some existing 2G or 3G wireless coverage the assumption was made that existing towers would be located within the cell and would require augmentation. These locations and the asset infrastructure (e.g., a tower structure) were assumed to be available for 4G deployment. It was further assumed that the presence of these assets effectively reduced the investment required to establish 4G service through augmentation of the site rather than requiring a more extensive 'greenfield' build.

# Methodology

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**Capital Investment Development** – Based on the count of cell coverage areas and the availability of existing asset infrastructure, an investment profile was developed and applied to the count of cell coverage areas requiring augmentation and the count of cell coverage areas requiring a 'greenfield' build. The model used a greenfield site investment of ~$425k and an augmentation site investment of ~$225k. These site investments represent the most significant portion of network investment. The model also incorporate middle mile and core network investments necessary to support the network operation.

# Methodology

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**Monthly Expense Development** – Recent U.S. Cellular operational expenses for network, customer, general, and administrative functions were allocated based on a combination of cell coverage areas and subscribers. Investment amortization along with financing costs and taxes were included with operational expenses to produce a total monthly expense. This expense was allocated to each census block in the target service area and compared to estimated users (subscribers) in that service area to derive a monthly cost per user.

**Revenue** – An ARPU of $40 was used as a funding benchmark.

# Methodology

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**Commercial Viability** – Estimated monthly service revenues were compared to the monthly costs of owning and operating 4G network and services to determine a contribution margin for each census block. A census block with a positive contribution margin is considered commercially viable and not in need of support. A census block with a negative contribution margin is assumed to require additional support for a commercial operator to provide service. To determine the support funding necessary for non-commercially viable areas, the monthly negative contribution is multiplied by the number of users in the census block.

*A positive contribution margin implies that the service area is commercially viable and carriers would likely operate networks in those areas without need of additional funding support. A negative contribution margin implies that the service area would likely need per subscriber funding support at the level equivalent to the negative contribution margin.*

# Key Assumptions

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Four key assumptions are included in the model to reflect potential support funding constraints. These constraints have a significant impact on the modeled support requirements.

**Number of Competitors**: The model can be run assuming a single service provider with a 100% market share in the targeted coverage areas, two providers each with a 50% market share in the targeted coverage areas, or three or four providers each with an equal market share in the targeted coverage areas.

**Monthly Funding Cap**: The model includes the ability to establish a threshold for the maximum amount of funding that would be used to support a subscriber. This cap is included to deal with the highest cost areas that are unlikely to be served with a 4G wireless technology because the cost to serve is excessive. For example, a funding cap established at $500 per month means that census blocks requiring a monthly support level in excess of $500 per user would not be funded.

# Key Assumptions

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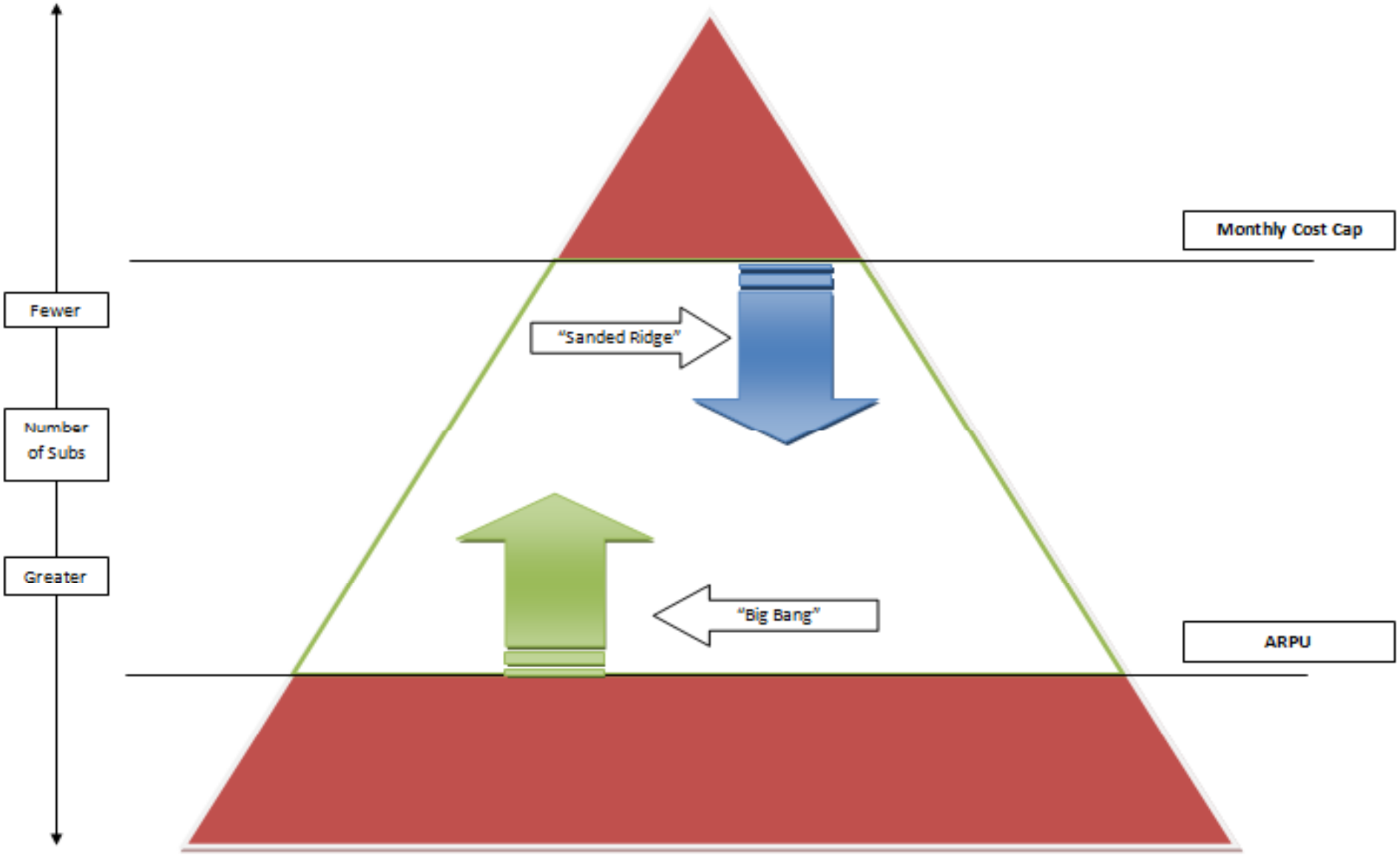
**"Big Bang" Approach** – The Model serves to close the "Mobile Broadband Gap" for the most subscriber lines possible by supporting those lines that have the lowest negative contribution margin first and then moving through the population of unserved consumers until the Funding Cap is hit . *See figure on slide 12.*

**100% Federally Funded** – The Model assumes all of the funding is coming from one source instead of using a 76% Federal benchmark.

# Support Model Foundation



# Output

## Maine

2

| Maine | 4G Unserved Areas |
|---|---|
| | All Areas |
| | All Investment |
| Total Subscribers | 1,365,723 |
| Funded Subscribers (Costs Exceed ARPU) | 79,902 |
| Unfunded Subscribers (Subs over Cap) | 495 |
| Total Funding (Required Monthly Funding) | $1,195,879 |
| Avg. Monthly Cost/(per funded subs) | $54.66 |
| Avg. Monthly Cost/(per total subs) | $25.72 |

Total Annual Modeled Funding = ~$14.4mil

# Output

## Maine

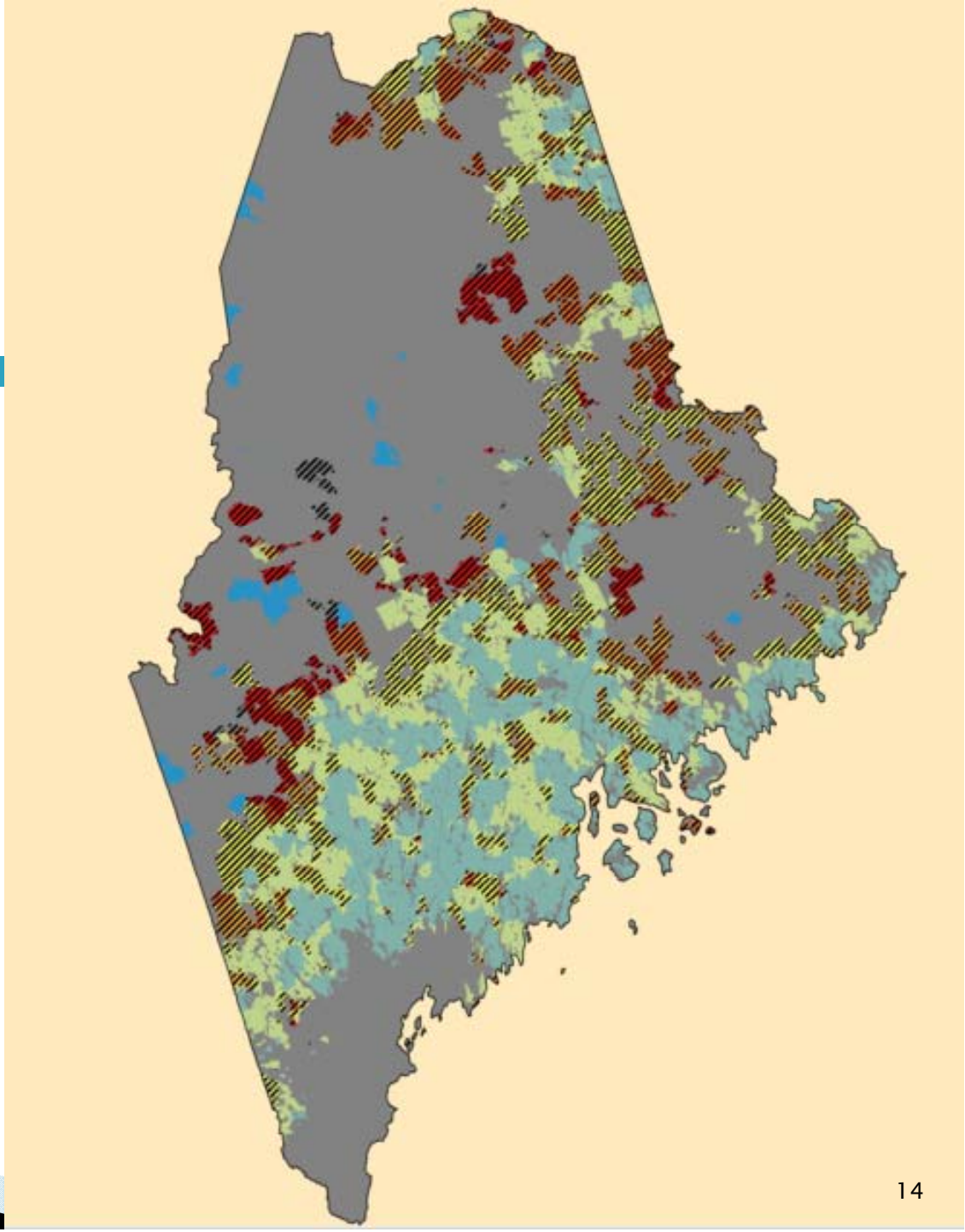
2

Funding Received

Data

**ContributionMarginPerSub**

- ($193.00) - ($50.00)
- ($49.99) - ($25.00)
- ($24.99) - ($10.00)
- ($9.99) - $0.00
- $0.01 - $10.00
- $10.01 - $25.00
- $25.01 - $45.00



# Output

## Nebraska

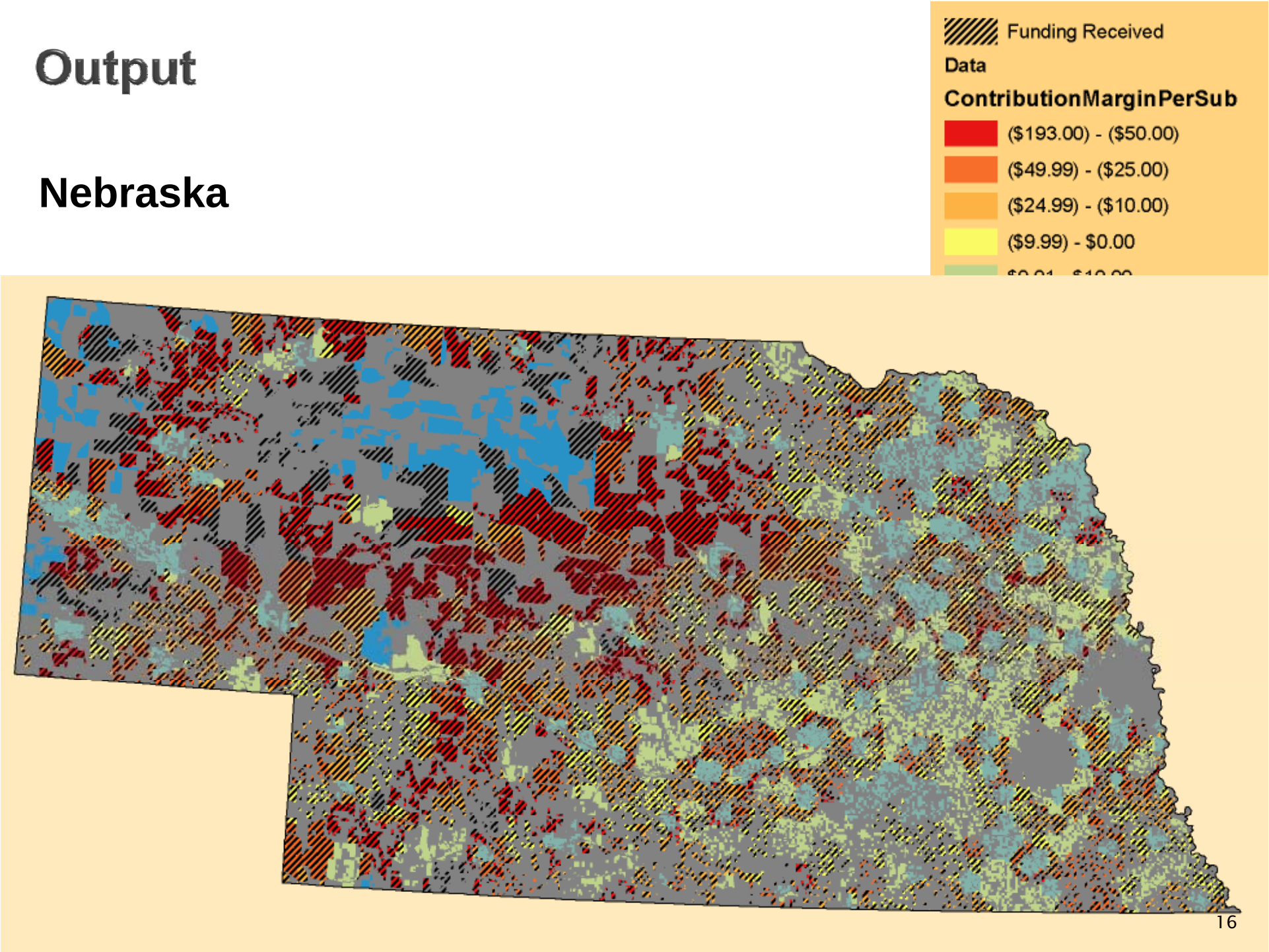
2

| Nebraska | 4G Unserved Areas |
|---|---|
| | All Areas |
| | All Investment |
| Total Subscribers | 1,892,612 |
| Funded Subscribers (Costs Exceed ARPU) | 177,127 |
| Unfunded Subscribers (Subs over Cap) | 1,513 |
| Total Funding (Required Monthly Funding) | $3,807,439 |
| Avg. Monthly Cost/(per funded subs) | $61.90 |
| Avg. Monthly Cost/(per total subs) | $26.19 |

Total Annual Modeled Funding = ~$45.7mil

# Output

## Nebraska



# Output

## West Virginia

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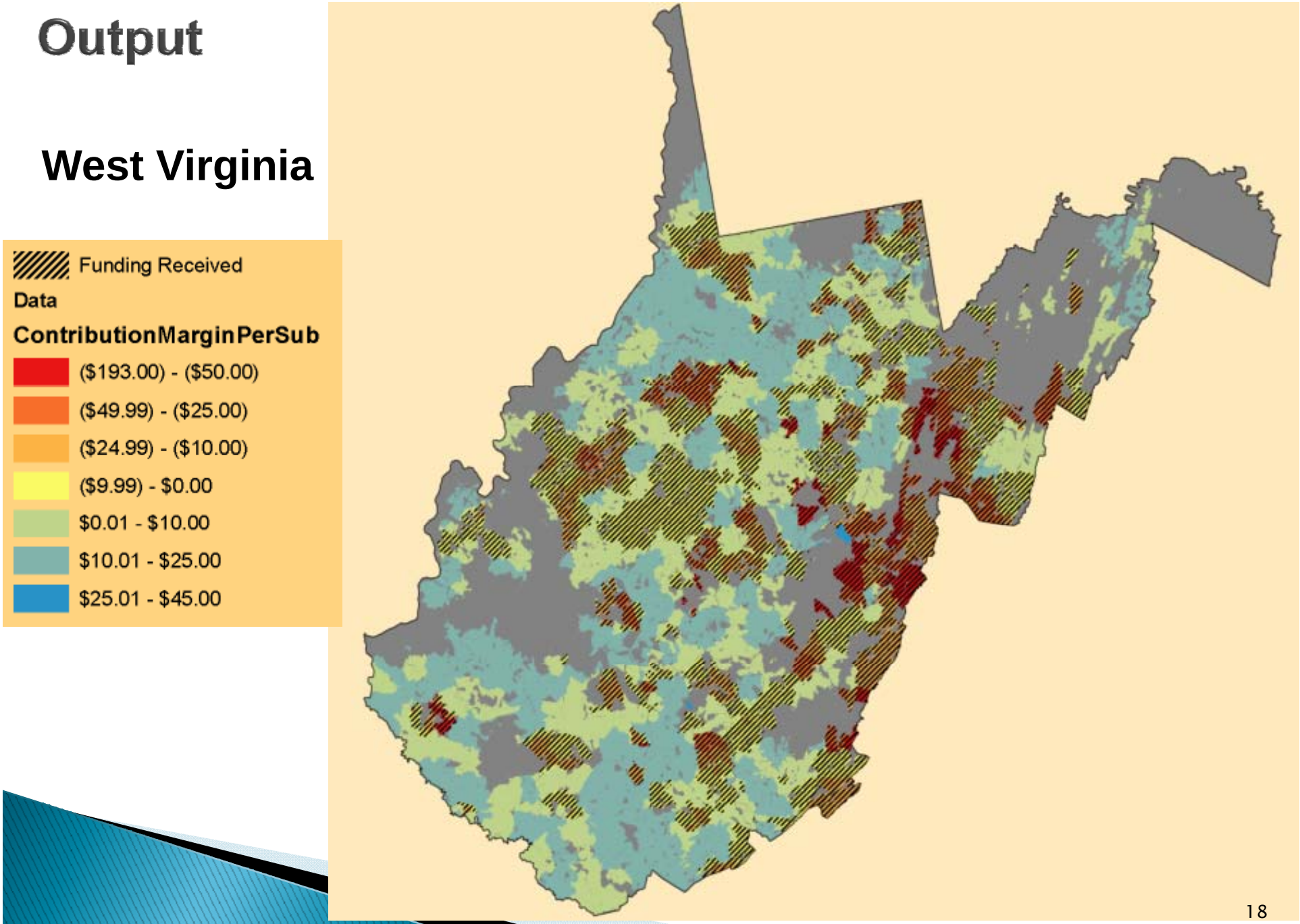
| West Virginia | 4G Unserved Areas |
|---|---|
| | All Areas |
| | All Investment |
| Total Subscribers | 1,715,288 |
| Funded Subscribers (Costs Exceed ARPU) | 96,709 |
| Unfunded Subscribers (Subs over Cap) | 253 |
| Total Funding (Required Monthly Funding) | $1,100,609 |
| Avg. Monthly Cost/(per funded subs) | $51.44 |
| Avg. Monthly Cost/(per total subs) | $25.30 |

Total Annual Modeled Funding = ~$13.2mil

# Output

## West Virginia



# Output

## Wisconsin

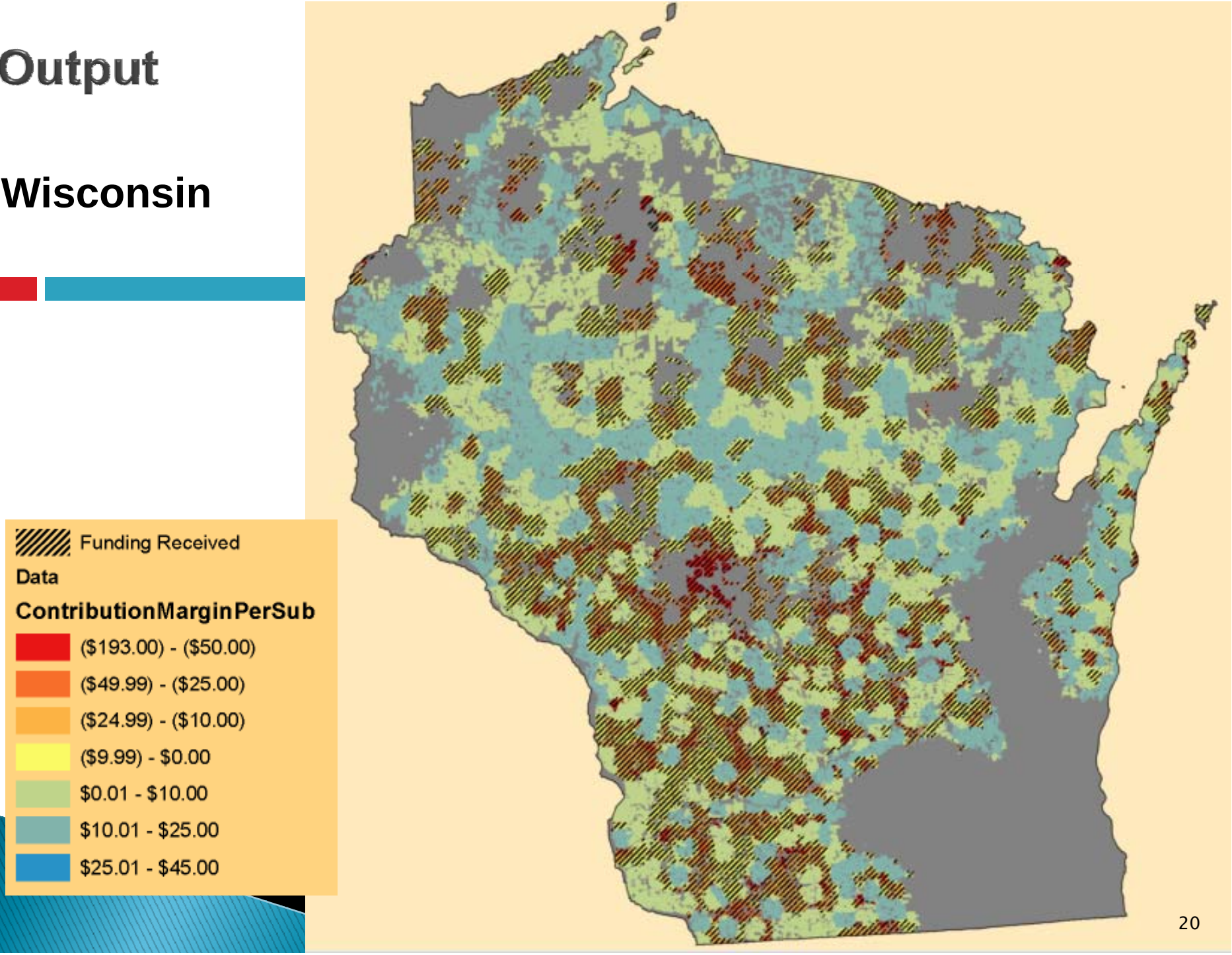
2

| Wisconsin | 4G Unserved Areas |
|---|---|
| | All Areas |
| | All Investment |
| Total Subscribers | 9,074,396 |
| Funded Subscribers (Costs Exceed ARPU) | 305,854 |
| Unfunded Subscribers (Subs over Cap) | 682 |
| Total Funding (Required Monthly Funding) | $4,068,106 |
| Avg. Monthly Cost/(per funded subs) | $53.36 |
| Avg. Monthly Cost/(per total subs) | $23.85 |

Total Annual Modeled Funding = ~$48.8mil

# Output

## Wisconsin



# Output

## Current USAC Support v. Modeled Funding

***Source: USAC HC01, Q1 2011***

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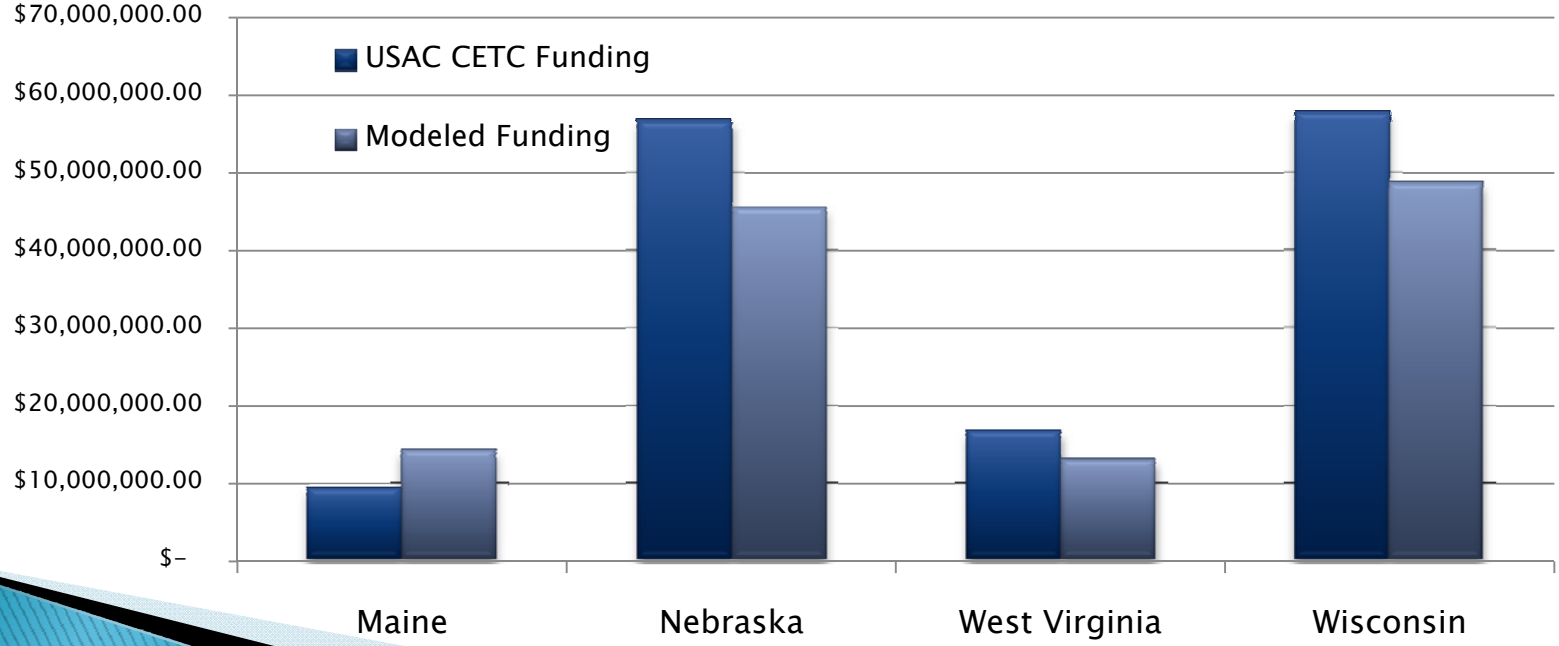
| | | USAC CETC Funding | | Modeled Funding |
|---|---|---|---|---|
| Maine | $ | 9,452,880.00 | $ | 14,350,547.89 |
| Nebraska | $ | 56,794,563.00 | $ | 45,689,273.64 |
| West Virginia | $ | 16,824,432.00 | $ | 13,207,308.93 |
| Wisconsin | $ | 57,885,342.00 | $ | 48,817,266.85 |
| | $ | 140,957,217.00 | $ | 122,064,397.32 |



# Output

## USAC Total Lines Supported v. Model Total Lines Supported

*Source: USAC HC05-09 Q1 2011*

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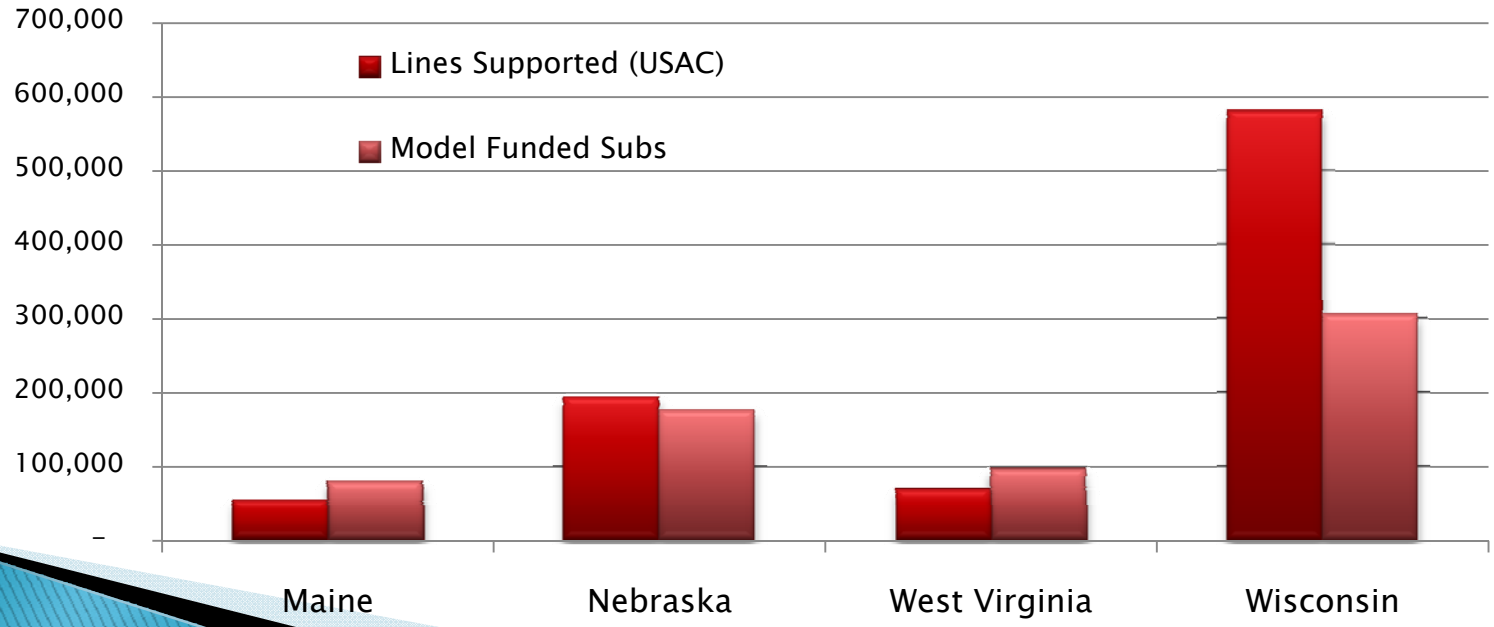
| | Lines Supported (USAC) | Model Funded Subs |
|---|---|---|
| Maine | 54,089 | 79,902 |
| Nebraska | 194,635 | 177,127 |
| West Virginia | 69,458 | 96,709 |
| Wisconsin | 581,031 | 305,954 |
| Total | 899,213 | 659,692 |