June 2012 CALIFORNIA BROADBAND REPORT

A Comparative Summary of Broadband Adoption for June 30, 2011 and June 30, 2012

BROADBANDUSA
CONNECTING AMERICA'S COMMUNITIES

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Edmund G. Brown, *Governor*

CALIFORNIA PUBLIC UTILITIES COMMISSION

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1 Executive Summary

Closing the Digital Divide is an important goal for the California Public Utilities Commission. State-financed programs, such as the California Advanced Services Fund and the California Emerging Technology Fund, exist to increase access to broadband and promote adoption and use of broadband.

The basis for this report is the Federal Communication Commission (FCC)'s Form 477[1], a semi-annual report filed by Internet service providers that shows how many wireline and fixed wireless connections they claim per census tract. This report does not include mobile subscriptions because they are not always reported at the census tract level, but rather at the statewide level. The data contained in the FCC's Form 477 are imperfect; therefore we make an effort in this paper to highlight areas we think are incorrect or misleading. Here are our findings:

1. There was over a 30% gap between average rural broadband penetration and large urban broadband penetration. Less than half of rural households were connected to broadband in 2012. About a quarter of that difference was due to lack of broadband access. Eight urban counties had penetration rates greater than 80%, whereas seven rural counties had penetration rates below 50%.

2. Like in rural counties, we observed low penetration (below 50%) also within large urban areas. Relatively lower income areas of Los Angeles and Sacramento had lower penetration rates than corresponding areas in San Francisco and San Diego.

3. The penetration rate for the state overall increased nearly 4% from 2011 to 2012, with households subscribing to faster plans. With one exception, penetration increased in the counties.

4. Compared to the U.S. overall, California had more connected households on a per household basis, but compared to other states, California ranked 14th in terms of broadband availability. But California's total connected population exceeded the combined total of the top 5 states.

Overview of Terms

This section presents the definition of common terms used throughout this report. Please note that some of these terms are similar, but have different meanings

Adoption Rate	Number of residential broadband subscriptions divided by households with broadband available
Availability	Number of households with broadband available, according to CPUC Broadband Availability data as of June 30, 2012. More details on this are in Section 5.
Broadband	Internet connection of at least 768 Kbps (Kilobits per second) download and 200 Kbps upload
Penetration Rate	Number of residential broadband subscriptions divided by total households
Subscriptions	Number of reportable connections according to the FCC's Form 477 report.
Total Households	Number of occupied housing units. More details on this are in Section 5.

[1] Data as of June 30, 2012. The FCC's report, "Internet Access Services: Status as of June 30, 2012" analyzes broadband subscription data nationwide. The report is available at http://www.fcc.gov/reports/internet-access-services-63012

2 Penetration Rate vs. Adoption Rate

Because of how we calculate the adoption rate, fluctuations in broadband availability can negatively affect it. Between 2011 and 2012, we observed an overall decrease in the adoption rate, but this was due to an increase in broadband availability rather than a decrease in broadband subscribers. The penetration rate is a more reliable measurement of the changes in subscriptions over time, because it doesn't fluctuate downward when there is an increase in broadband availability (the denominator in the equation). However, the adoption rate is useful in helping us estimate how much lack of broadband access is a factor in low penetration rates, as we will see later in this report.

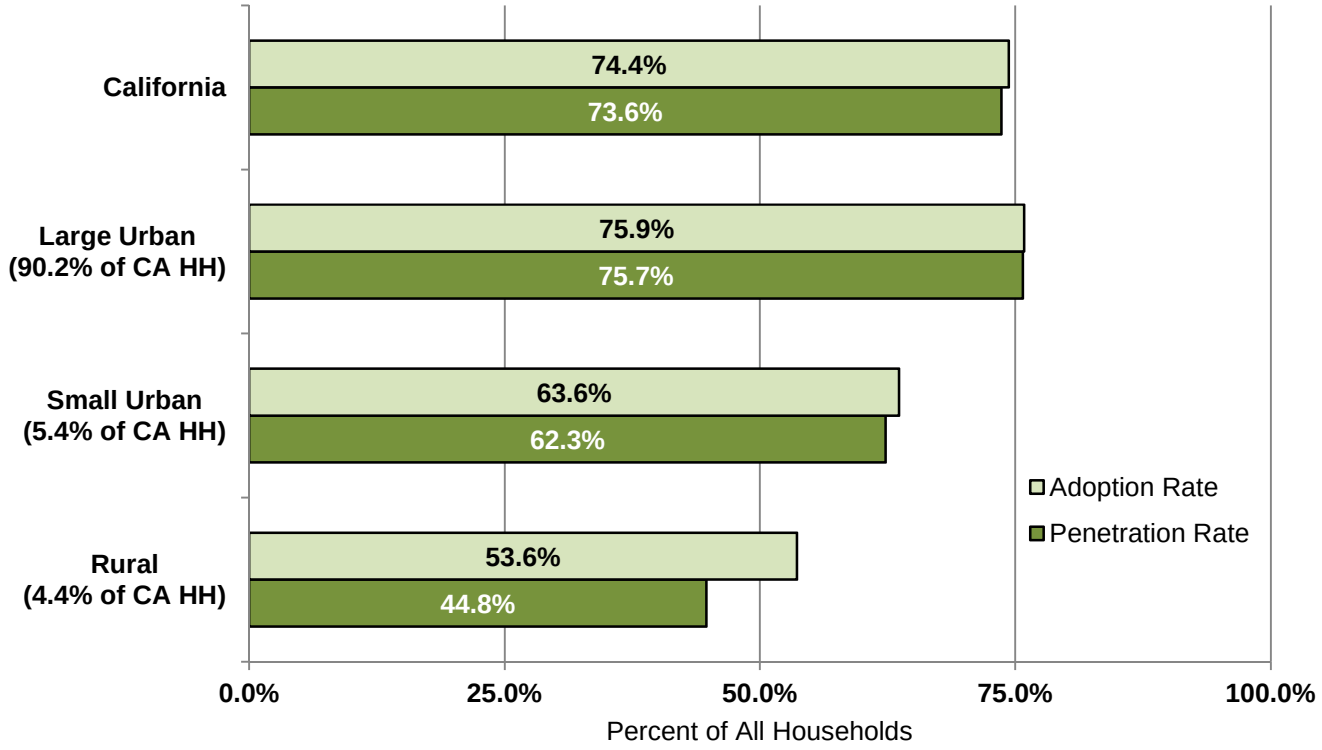
Broadband Penetration: Rural vs. Urban

Figure 1.1 compares adoption and penetration rates among urban (50,000 people or more), small urban (between 2,500 and 49,999 people), and rural (less than 2,500 people) areas to demonstrate the extent to which the lack of broadband penetration is due to lack of infrastructure. The greatest challenge for increasing broadband penetration in California lies in its rural areas, where fewer than half of the households (44.8%) subscribe to broadband service. This is in stark contrast to the large urban areas where more than three fourths (75.7%) of households subscribe to broadband. Looking at this 30.9% gap in rural versus urban broadband penetration, we estimate that about one quarter of it is explained by lack of access to broadband.

In order to estimate how much of the penetration gap was due to lack of infrastructure, we subtracted the rural adoption rate (53.6%) from the large urban adoption rate (75.9%) to estimate the adoption rate gap. That resulted in 22.3%. We then subtracted the adoption rate gap from the penetration rate gap (30.9% - 22.3% = 8.6%) and divided that by the penetration rate gap, which resulted in 27.8%, or just over one quarter. The remaining 72.2% percent of the rural-urban penetration gap is explained by a combination of other factors such as price/affordability, reliability, lack of alternatives, over-statement of provider coverage, and level of English language fluency, as suggested by other studies[2].

[2] Refer to "California's Digital Divide, 2013" by the Public Policy Institute of California. http://www.ppic.org/main/publication_show.asp?i=263

FIGURE 1.1: Broadband Penetration Rates – Rural vs. Urban



Source: FCC Form 477

Broadband Penetration and Adoption Rates by County

Figure 3.1 summarizes broadband penetration rates and adoption rates for each of California's counties as of June 30, 2012 and further highlights the rural-urban penetration gap. Eight counties, all with large or small urban centers, had penetration rates greater than 80%. In contrast, seven counties, predominantly or entirely rural, had penetration rates below 50%. The counties with greater than 80% were the Bay Area counties of Contra Costa, Marin, San Mateo, Santa Clara, the southland counties of Orange, San Diego, and Ventura, and the very small county of Alpine which has a large number of second homes that have broadband connections in vacation homes. The counties with low penetration rates were Colusa, Glenn, Mendocino, Siskiyou, Tehama, Tuolumne, and Tulare.

Data for Del Norte, Kings, Modoc, Mono, and Trinity counties were withheld to protect confidentiality of the individual service providers, either because one service provider had over 80% of the area's subscriptions, or there were fewer than three service providers in the area, in accordance with guidelines developed by the United States Department of Commerce.

FIGURE 1.2: Penetration and Adoption Rates by County, June 2012

County	Households[1]	Households with Fixed Broadband Available	Number of Providers	Residential Fixed Broadband Subscriptions	Adoption Rate	Penetration Rate
California	***12,675,807***	***12,529,217***	**71**	**9,318,958**	**74.4%**	**73.6%**
Alameda	547,631	547,063	6	423,076	77.3%	77.3%
Alpine	499	427	4	478	112.0%[2]	**95.8%**
Amador	14,665	13,165	5	9,939	75.5%	67.8%
Butte	88,426	87,999	5	56,324	64.0%	63.7%
Calaveras	19,045	16,195	6	12,559	77.5%	65.9%

FIGURE 1.2: Penetration and Adoption Rates by County, June 2012

County	Households[1]	Households with Fixed Broadband Available	Number of Providers	Residential Fixed Broadband Subscriptions	Adoption Rate	Penetration Rate
Colusa	7,085	6,725	5	3,440	51.2%	48.5%
Contra Costa	378,291	378,203	7	312,087	82.5%	**82.5%**
Del Norte	9,953	9,209	3	See note below		
El Dorado	70,415	64,923	9	46,877	72.2%	66.6%
Fresno	293,265	291,315	9	171,234	58.8%	58.4%
Glenn	9,957	9,716	4	4,586	47.2%	46.1%
Humboldt	56,376	52,218	6	33,224	63.6%	58.9%
Imperial	49,417	47,633	5	25,774	54.1%	52.2%
Inyo	8,056	6,692	4	4,329	64.7%	53.7%
Kern	258,008	250,000	9	157,736	63.1%	61.1%
Kings	41,595	39,515	2	See note below		
Lake	26,654	26,600	3	15,143	56.9%	56.8%
Lassen	10,069	9,189	5	5,770	62.8%	57.3%
Los Angeles	3,253,919	3,248,543	14	2,330,575	71.7%	71.6%
Madera	43,555	42,891	6	25,424	59.3%	58.4%
Marin	103,404	102,375	9	85,712	83.7%	**82.9%**
Mariposa	7,786	6,324	4	4,822	76.3%	61.9%
Mendocino	35,145	28,623	7	13,481	47.1%	38.4%
Merced	75,963	75,928	6	38,706	51.0%	51.0%
Modoc	4,094	2,221	2	See note below		
Mono	5,794	4,683	2	See note below		
Monterey	125,305	117,708	9	79,272	67.3%	63.3%
Napa	49,124	49,124	7	35,716	72.7%	72.7%
Nevada	41,707	40,513	8	28,646	70.7%	68.7%
Orange	997,742	996,987	11	831,240	83.4%	**83.3%**
Placer	134,903	132,345	15	105,090	79.4%	77.9%
Plumas	9,028	8,838	5	5,839	66.1%	64.7%
Riverside	694,405	684,931	16	554,964	81.0%	79.9%
Sacramento	516,814	516,761	11	374,377	72.4%	72.4%
San Benito	16,999	16,174	4	10,453	64.6%	61.5%
San Bernardino	615,382	599,999	11	450,396	75.1%	73.2%
San Diego	1,094,612	1,082,302	10	903,313	83.5%	**82.5%**
San Francisco	346,970	346,937	10	262,654	75.7%	75.7%
San Joaquin	216,579	216,578	5	133,952	61.8%	61.8%
San Luis Obispo	102,837	97,583	7	75,178	77.0%	73.1%
San Mateo	259,001	257,706	10	213,894	83.0%	**82.6%**
Santa Barbara	143,224	140,466	8	100,634	71.6%	70.3%
Santa Clara	610,137	609,774	10	492,036	80.7%	**80.6%**
Santa Cruz	94,597	93,739	8	65,883	70.3%	69.6%
Shasta	70,769	70,458	7	44,723	63.5%	63.2%
Sierra	1,483	1,363	5	848	62.2%	57.2%
Siskiyou	19,598	17,860	6	7,670	42.9%	39.1%
Solano	143,056	143,056	7	108,129	75.6%	75.6%

FIGURE 1.2: Penetration and Adoption Rates by County, June 2012

County	Households[1]	Households with Fixed Broadband Available	Number of Providers	Residential Fixed Broadband Subscriptions	Adoption Rate	Penetration Rate
Sonoma	186,771	184,758	9	137,067	74.2%	73.4%
Stanislaus	165,477	165,430	6	103,159	62.4%	62.3%
Sutter	31,524	31,524	4	19,872	63.0%	63.0%
Tehama	23,926	23,776	7	10,778	45.3%	45.0%
Trinity	6,097	3,493	2	See note below		
Tulare	132,171	131,292	7	59,877	45.6%	45.3%
Tuolumne	22,184	17,907	5	11,068	61.8%	49.9%
Ventura	268,392	266,787	8	216,253	81.1%	**80.6%**
Yolo	70,306	70,270	8	48,371	68.8%	68.8%
Yuba	24,436	24,402	4	14,041	57.5%	57.5%

Note: Results are not displayed when, in accordance with US Department of Commerce guidelines, doing so would risk disclosure of confidential data. Broadband provider confidentiality is protected for any county where fewer than 3 providers submitted data or if any one provider had more than 80% of reported connections in that county.

[1]CPUC estimate based on data from the California Department of Finance.

[2]Adoption rate exceeds 100% because connections include vacation homes, which are not included in household counts.

Gaps in Urban Broadband Penetration

In addition to the large rural-urban penetration gap, we also observed a penetration gap among census tracts within large urban areas. The image below shows census tracts with low penetration rates highlighted in red and orange. Notice that some census tracts in Los Angeles and Sacramento are shaded red and dark orange, where penetration is below 50%. We know from the broadband availability data that the low penetration rates in these tracts is less a function of broadband access than it is of other factors such as affordability and digital literacy, because broadband availability in these areas is high (>90%), but subscription rates are below the average for the area as a whole.

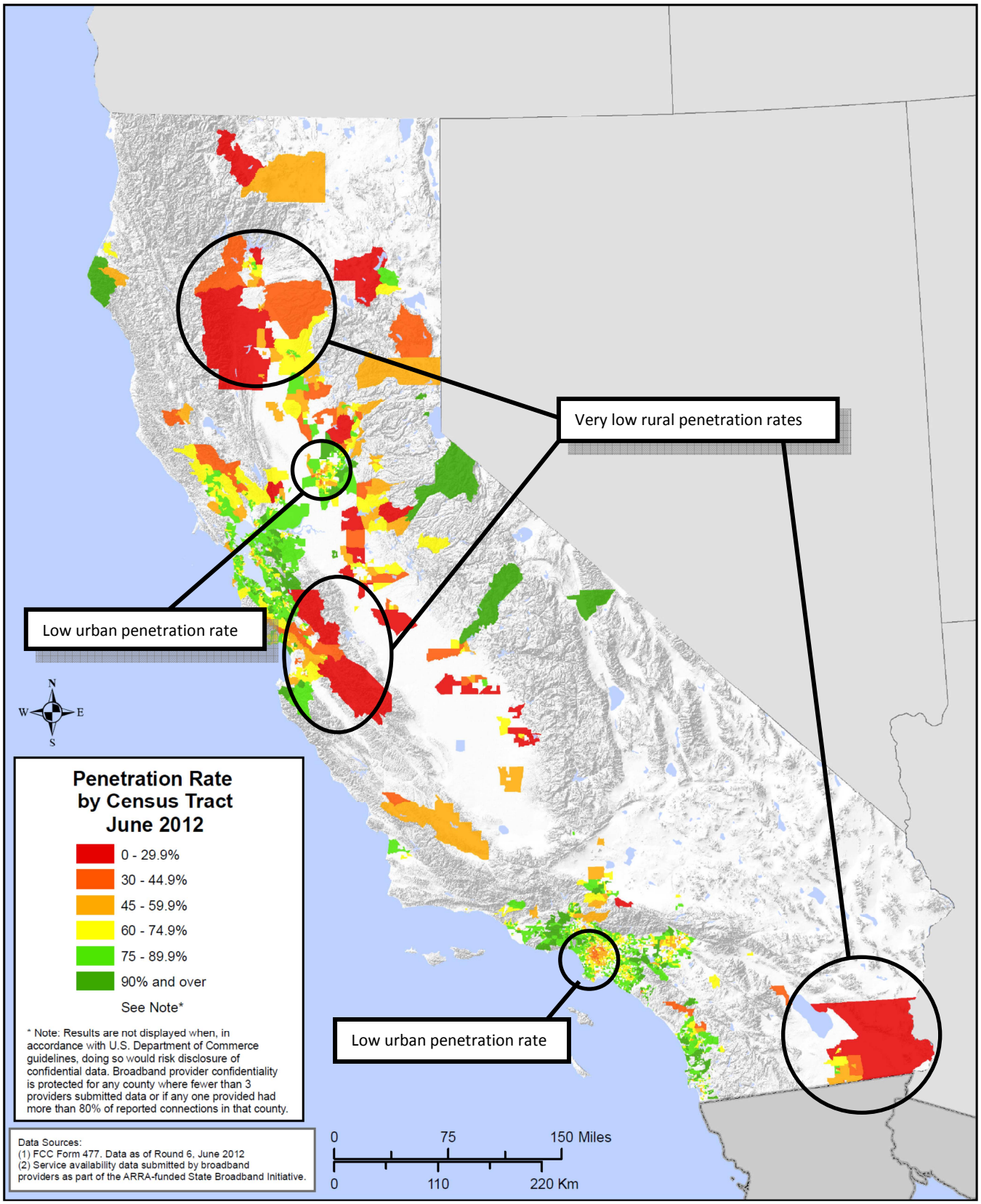
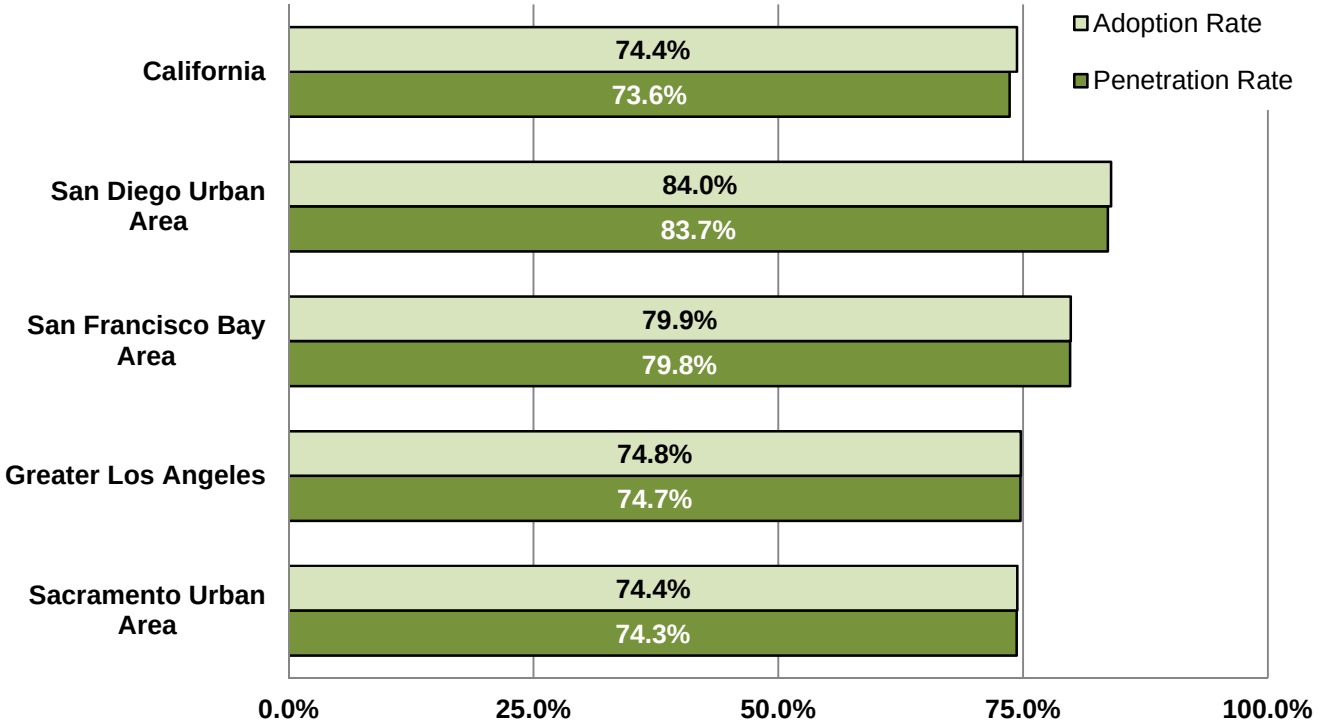

Very low rural penetration rates
Low urban penetration rate
Low urban penetration rate
N
W
E
S
Penetration Rate by Census Tract June 2012
0 - 29.9%
30 - 44.9%
45 - 59.9%
60 - 74.9%
75 - 89.9%
90% and over
See Note*
* Note: Results are not displayed when, in accordance with U.S. Department of Commerce guidelines, doing so would risk disclosure of confidential data. Broadband provider confidentiality is protected for any county where fewer than 3 providers submitted data or if any one provided had more than 80% of reported connections in that county.
Data Sources:
(1) FCC Form 477. Data as of Round 6, June 2012
(2) Service availability data submitted by broadband providers as part of the ARRA-funded State Broadband Initiative.
0
75
150 Miles
0
110
220 Km

Figure 1.4, below, shows penetration rates for California urban areas with more than one million people. Los Angeles and Sacramento have some census tracts with very low penetration rates, and this is reflected in the lower average for those two urban areas compared to San Francisco and San Diego.

The San Diego Urban Area includes only the City of San Diego; the San Francisco Bay Area includes San Francisco, Oakland, San Jose, Vallejo, Concord, and Livermore; Greater Los Angeles includes Los Angeles, Long Beach, Anaheim, Mission Viejo, Lake Forest, San Clemente, Riverside, San Bernardino, Simi Valley, and Thousand Oaks; the Sacramento Urban Area includes only the City of Sacramento.

FIGURE 1.4: Broadband Penetration Rates for California's Major Urban Areas



Source: FCC Form 477

Figures 1.5 through 1.8 are maps of each of these major urban areas. Notice the disparity in broadband penetration rates between neighborhoods. In Greater Los Angeles, for example, South Los Angeles has census tracts with penetration rates below 45 percent, while many suburban neighborhoods like those in Thousand Oaks, Simi Valley, and Orange County show penetration rates greater than 90 percent.

FIGURE 1.5: Broadband Penetration Rates: Greater Los Angeles

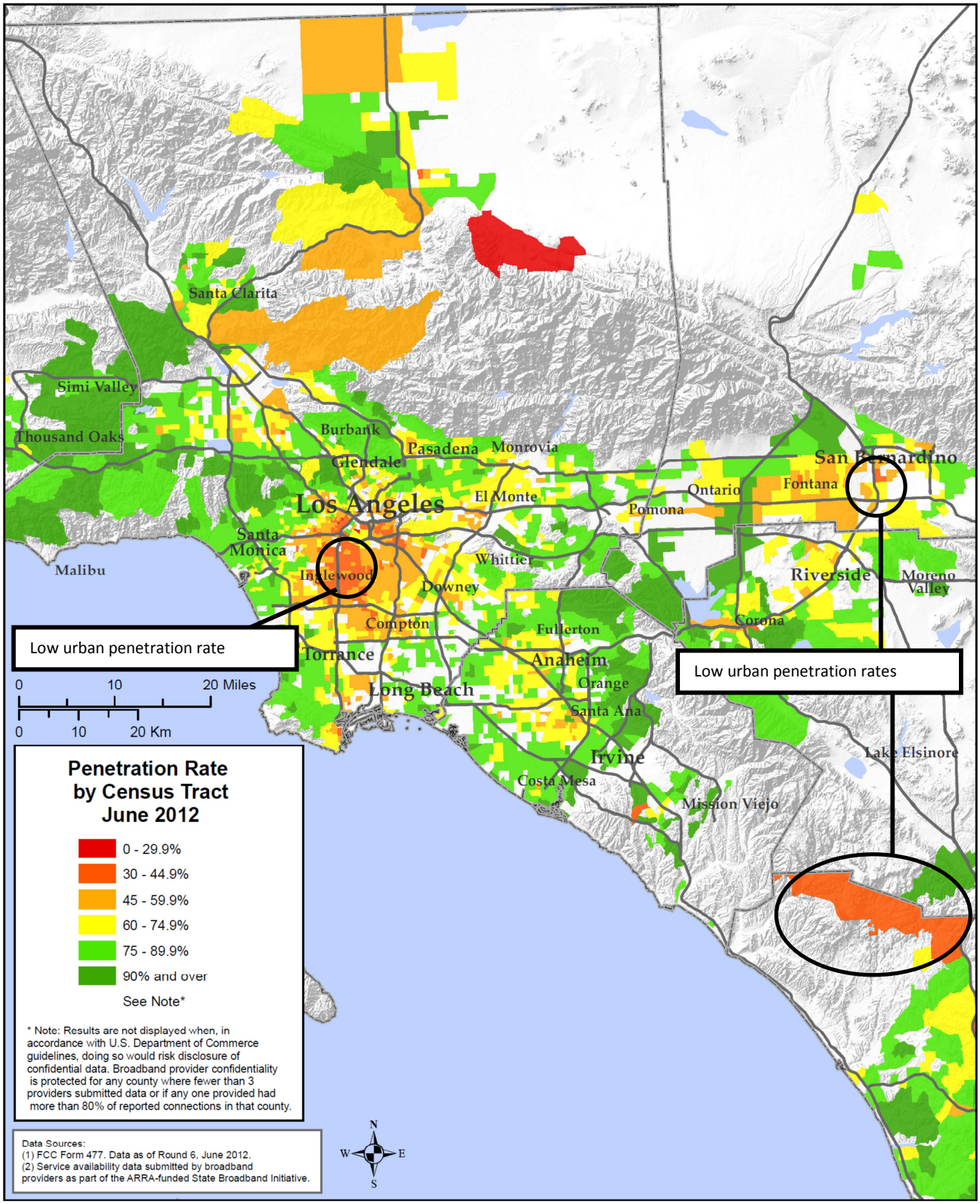


FIGURE 1.6: Broadband Penetration Rates: Sacramento Urban Area

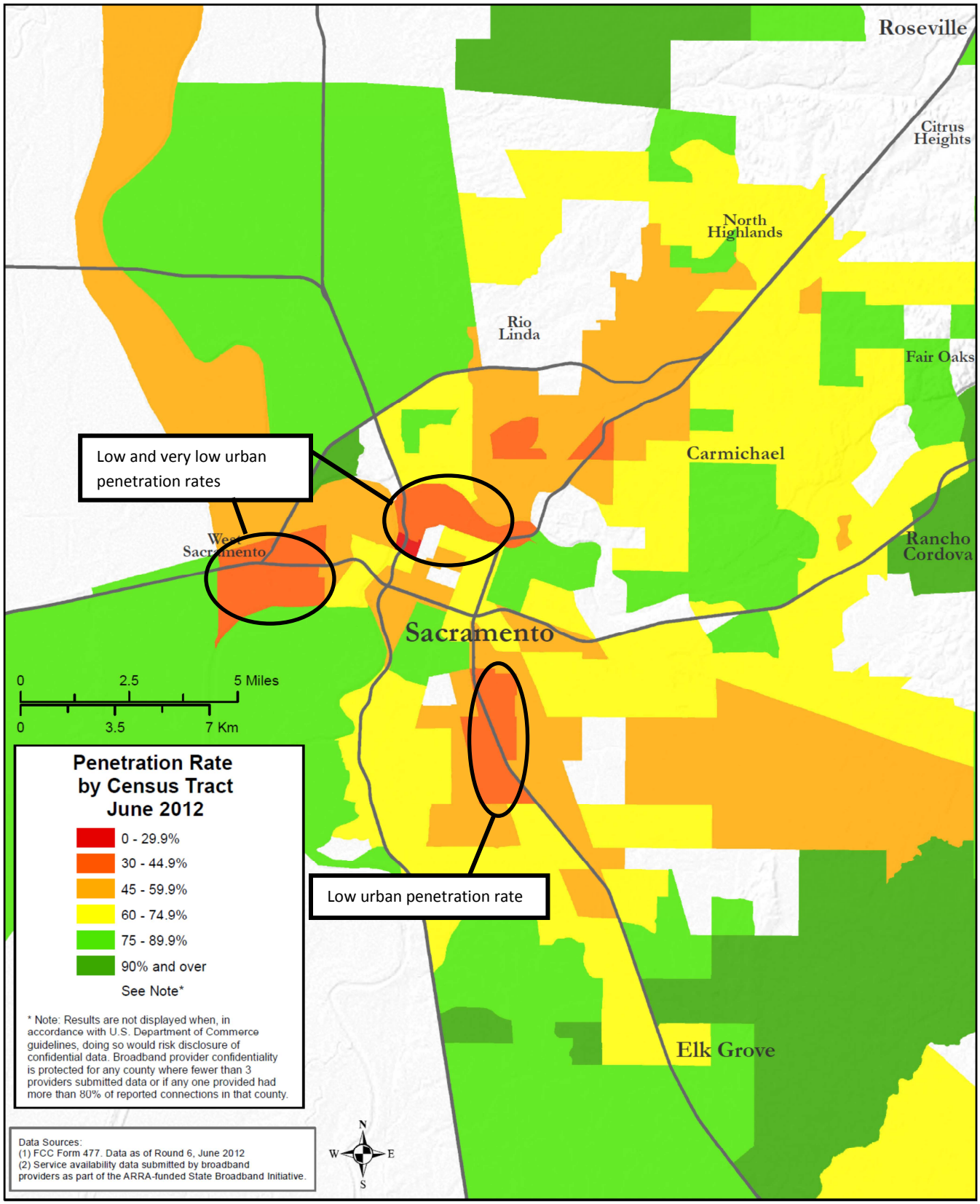


FIGURE 1.7: Broadband Penetration Rates: San Francisco Bay Area

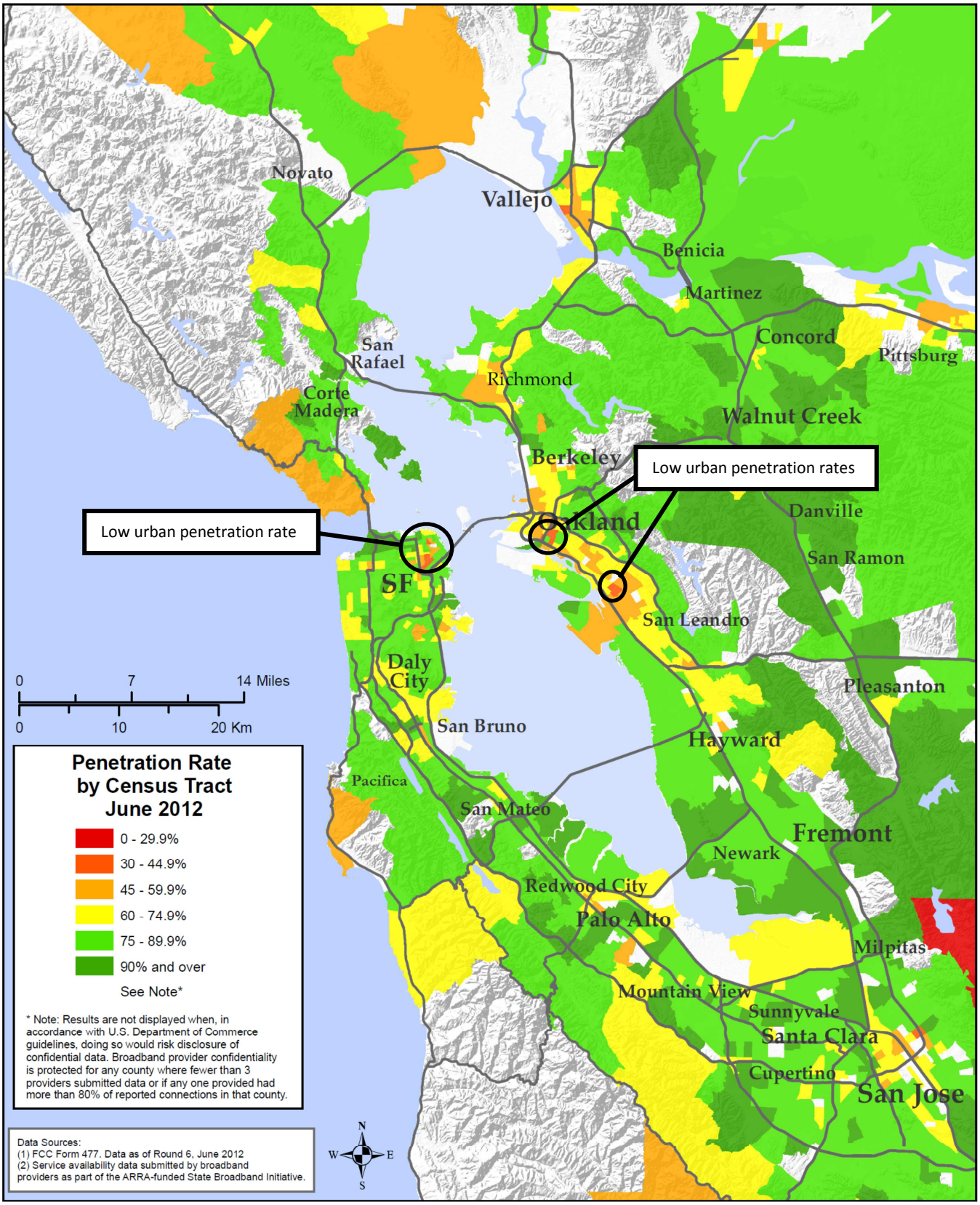
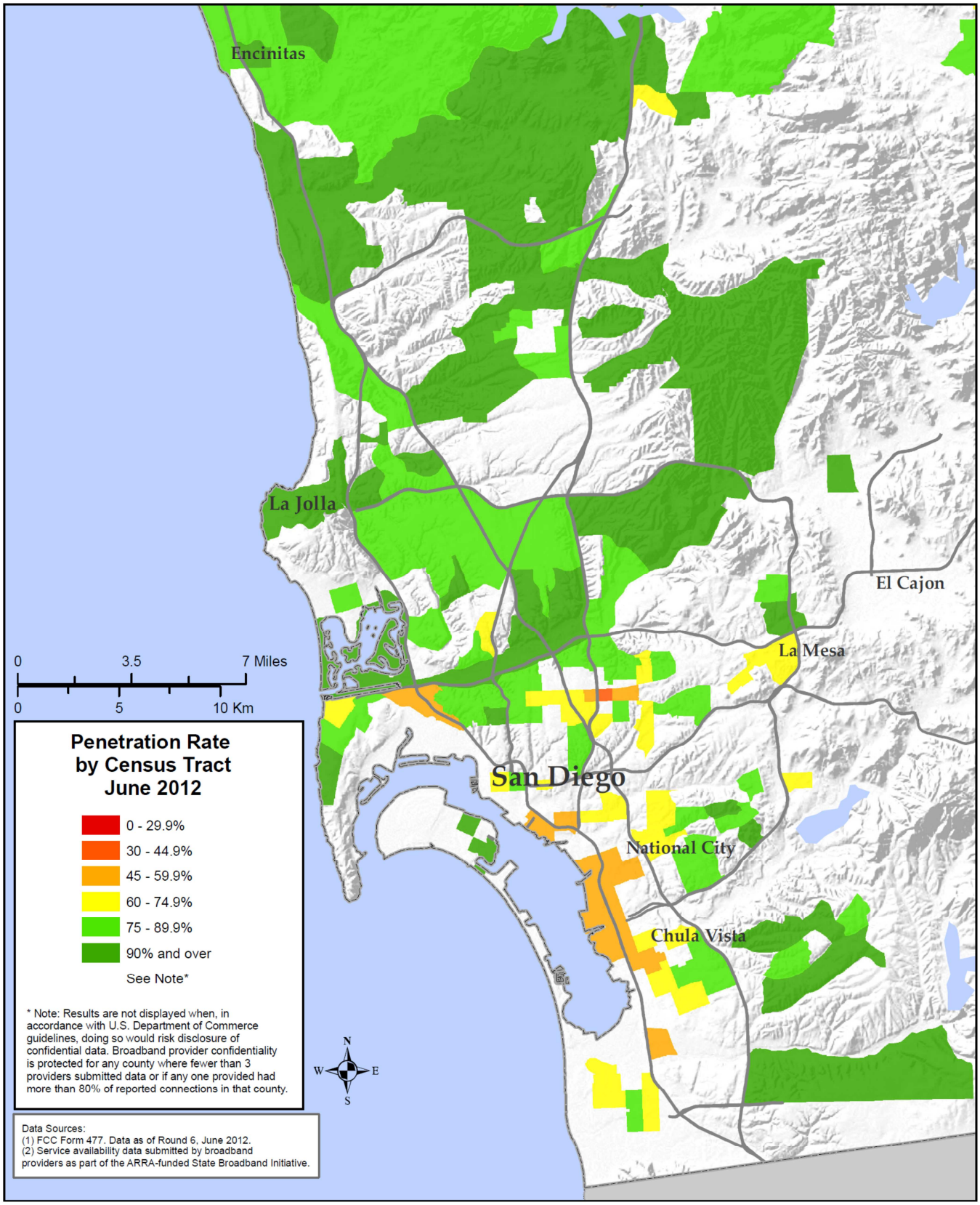


FIGURE 1.8: Broadband Penetration Rates: San Diego Urban Area



Penetration Rate Change

Between 2011 and 2012, the overall broadband penetration rate increased by 4%. The following Figure 3.2 summarizes changes in broadband penetration rates from 2011 to 2012 for the state as well as each county. Changes in penetration rates are shown only where confidentiality criteria were met for both reporting periods. We found only one county, Lassen, where the penetration rate dropped between 2011 and 2012, and this was due to a decrease in subscriptions by one provider, which resulted in an overall decrease of 808 subscriptions.

FIGURE 1.8: Changes in Penetration and Adoption Rates by County

	June 2011			June 2012			
County	Number of Providers	Residential Fixed Broadband Subscriptions	Penetration Rate	Number of Providers	Residential Fixed Broadband Subscriptions	Penetration Rate	Penetration Rate Change
California	***74***	***8,775,681***	***69.5%***	**71**	***9,318,958***	**73.6%**	**4.1%**
Alameda	9	404,206	74.0%	6	423,076	77.3%	**3.3%**
Alpine	3	316	63.6%	4	478	95.8%	**32.2%**
Amador	4	9,196	62.9%	5	9,939	67.8%	**4.8%**
Butte	4	52,337	59.4%	5	56,324	63.7%	**4.3%**
Calaveras	5	11,292	59.5%	6	12,559	65.9%	**6.5%**
Colusa	3	*See note below*		5	3,440	48.5%	**--**
Contra Costa	7	296,512	78.6%	7	312,087	82.5%	**3.9%**
Del Norte	2	*See note below*		3	*See note below*		**--**
El Dorado	8	43,498	61.9%	9	46,877	66.6%	**4.7%**
Fresno	7	158,178	54.2%	9	171,234	58.4%	**4.1%**
Glenn	3	3,790	38.2%	4	4,586	46.1%	**7.8%**
Humboldt	6	30,996	55.1%	6	33,224	58.9%	**3.8%**
Imperial	5	22,978	46.7%	5	25,774	52.2%	**5.5%**
Inyo	4	*See note below*		4	4,329	53.7%	**--**
Kern	9	144,354	56.2%	9	157,736	61.1%	**4.9%**
Kings	2	*See note below*		2	*See note below*		**--**
Lake	2	*See note below*		3	15,143	56.8%	**--**
Lassen	5	6,578	65.4%	5	5,770	57.3%	**-8.1%**
Los Angeles	14	2,210,695	68.1%	14	2,330,575	71.6%	**3.6%**
Madera	5	21,899	50.4%	6	25,424	58.4%	**8.0%**
Marin	9	83,129	80.5%	9	85,712	82.9%	**2.4%**
Mariposa	4	*See note below*		4	4,822	61.9%	**--**
Mendocino	5	12,533	35.7%	7	13,481	38.4%	**2.6%**
Merced	6	34,446	45.4%	6	38,706	51.0%	**5.5%**
Modoc	3	*See note below*		2	*See note below*		**--**
Mono	3	2,633	45.5%	2	*See note below*		**--**
Monterey	7	75,115	59.8%	9	79,272	63.3%	**3.5%**
Napa	5	33,874	69.1%	7	35,716	72.7%	**3.6%**
Nevada	6	26,411	63.4%	8	28,646	68.7%	**5.2%**
Orange	13	778,777	78.1%	11	831,240	83.3%	**5.2%**
Placer	13	98,355	73.4%	15	105,090	77.9%	**4.5%**
Plumas	5	5,144	57.1%	5	5,839	64.7%	**7.6%**
Riverside	15	503,643	72.9%	16	554,964	79.9%	**7.1%**

FIGURE 1.8: Changes in Penetration and Adoption Rates by County

	June 2011			June 2012			
County	Number of Providers	Residential Fixed Broadband Subscriptions	Penetration Rate	Number of Providers	Residential Fixed Broadband Subscriptions	Penetration Rate	Penetration Rate Change
Sacramento	11	357,985	69.4%	11	374,377	72.4%	**3.0%**
San Benito	5	9,678	57.2%	4	10,453	61.5%	**4.2%**
San Bernardino	13	393,927	64.2%	11	450,396	73.2%	**9.0%**
San Diego	10	865,963	79.4%	10	903,313	82.5%	**3.2%**
San Francisco	11	253,231	73.1%	10	262,654	75.7%	**2.6%**
San Joaquin	8	126,557	58.6%	5	133,952	61.8%	**3.2%**
San Luis Obispo	5	68,600	67.0%	7	75,178	73.1%	**6.1%**
San Mateo	10	203,460	78.7%	10	213,894	82.6%	**3.9%**
Santa Barbara	6	77,982	54.6%	8	100,634	70.3%	**15.6%**
Santa Clara	9	469,221	77.3%	10	492,036	80.6%	**3.3%**
Santa Cruz	9	62,439	66.1%	8	65,883	69.6%	**3.5%**
Shasta	7	40,376	57.2%	7	44,723	63.2%	**6.0%**
Sierra	5	687	46.3%	5	848	57.2%	**10.8%**
Siskiyou	7	6,811	34.8%	6	7,670	39.1%	**4.3%**
Solano	8	103,069	72.4%	7	108,129	75.6%	**3.2%**
Sonoma	9	128,517	69.0%	9	137,067	73.4%	**4.4%**
Stanislaus	7	95,981	58.0%	6	103,159	62.3%	**4.3%**
Sutter	3	18,394	58.4%	4	19,872	63.0%	**4.6%**
Tehama	6	9,153	38.4%	7	10,778	45.0%	**6.7%**
Trinity	1	*See note below*		2	*See note below*		**--**
Tulare	7	54,666	41.6%	7	59,877	45.3%	**3.7%**
Tuolumne	4	*See note below*		5	11,068	49.9%	**--**
Ventura	8	203,441	76.1%	8	216,253	80.6%	**4.5%**
Yolo	8	46,285	65.5%	8	48,371	68.8%	**3.3%**
Yuba	3	*See note below*		4	14,041	57.5%	**--**

Note: Results are not displayed when, in accordance with US Department of Commerce guidelines, doing so would risk disclosure of confidential data. Broadband provider confidentiality is protected for any county where fewer than three providers submitted data or if any one provider had more than 80% of reported connections in that county.

3 Broadband Subscriptions by Connection Speed

Not only did broadband penetration increase overall from 2011 to 2012, we also observed more broadband subscribers upgrading to faster speeds. Figure 2.1, below, reports the total number of fixed broadband connections by speed for both June 2011 and June 2012. While there was more than a 6% increase in broadband subscriptions between 2011 (9,594,236) and 2012 (10,176,967), a larger percentage of those subscriptions in 2012 were for higher download speeds, and a smaller percentage of residential connections had download speeds of less than 3 megabits per second in 2012 (20.8 percent), than in 2011 (25.5 percent).

FIGURE 2.1: Distribution of Reportable Fixed Connections by Speed Tier in California

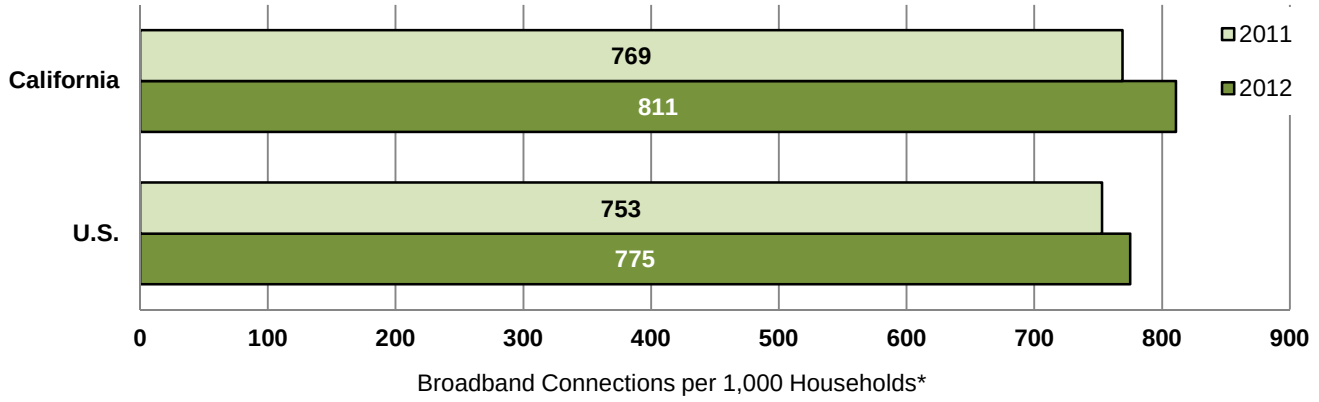
		2011				2012			
Speed Tier		All Connections		Residential Connections		All Connections		Residential Connections	
Download Speed	< 3 Mbps	2,605,837	27.2%	2,233,666	25.5%	2,274,480	22.3%	1,938,277	20.8%
	≥ 3 Mbps and < 6 Mbps	1,670,084	17.4%	1,399,789	15.9%	1,776,892	17.5%	1,516,535	16.3%
	≥ 6 Mbps	5,318,315	55.4%	5,142,226	58.6%	6,125,598	60.2%	5,864,146	62.9%
	Total	***9,594,236***	***100.0%***	***8,775,681***	***100.0%***	***10,176,970***	***100.0%***	***9,318,958***	***100.0%***
Upload Speed	< 768 Kbps	3,254,549	33.9%	2,819,759	32.1%	3,559,231	35.0%	3,187,650	34.2%
	≥ 768 Kbps and < 1.5 Mbps	3,257,756	34.0%	3,105,138	35.4%	2,863,143	28.1%	2,647,704	28.4%
	≥ 1.5 Mbps	3,081,931	32.1%	2,850,784	32.5%	3,754,593	36.9%	3,483,604	37.4%
	Total	***9,594,236***	***100.0%***	***8,775,681***	***100.0%***	***10,176,970***	***100.0%***	***9,318,958***	***100.0%***

Source: FCC Form 477

Comparing Broadband Penetration Rates in California and the US

Between 2011 and 2012, broadband penetration in California was higher than in the US, and it grew faster than in the US overall. As shown below, California had 3.6% more broadband subscribers per 1,000 households than the US in 2012. The United States estimate comes from the FCC's "Internet Access Services: Status as of June 30, 2012" report, and the California number comes from broadband availability data and the US Census Bureau's American Community Survey one-year estimates for 2011 and 2012.

FIGURE 2.1: Broadband Connections per 1,000 Households, California and US



Source: FCC Form 477, FCC's "Internet Access Services: Status as of June 30, 2012" report, and US Census Bureau American Community Survey 1-year household estiamtes in 2011 and 2012.

Comparing California to Other States

Despite the California's favorable penetration rate compared to the US overall, California ranks only 14th in terms of broadband availability by population. However, it is important to note that California has some of the most difficult and varied terrain, and yet it has more broadband availability than the top five states combined. The table below comes from the FCC's National Broadband Map[3] and ranks each state/district in terms of the percent of population with access to broadband speeds per the federal definition of "broadband[4]." The data is as of June 30, 2013.

FIGURE 2.3: Top 20 States/Districts Based On Percent Population With Broadband Access

Rank	State/District	% Population with access to > 768 Kb/s down and 200 Kb/s up	Margin of Error	2013 Population
1	District Of Columbia	100.00%	0.00%	646,449
2	New Jersey	100.00%	0.01%	8,899,339
3	Delaware	100.00%	0.01%	925,749
4	Rhode Island	100.00%	0.02%	1,051,511
5	Florida	100.00%	0.03%	19,552,860
6	Illinois	100.00%	0.04%	12,882,135
7	Connecticut	100.00%	0.04%	3,596,080
8	Kansas	100.00%	0.03%	2,893,957
9	Maryland	99.94%	0.06%	5,928,814
10	Massachusetts	99.91%	0.08%	6,692,824
11	Nevada	99.91%	0.08%	2,790,136
12	Indiana	99.90%	0.10%	6,570,902
13	Iowa	99.90%	0.10%	3,090,416
14	**California**	**99.88%**	**0.10%**	**38,332,521**
15	Texas	99.87%	0.12%	26,448,193
16	Mississippi	99.85%	0.15%	2,991,207
17	New York	99.83%	0.16%	19,651,127
18	Utah	99.82%	0.14%	2,900,872
19	Michigan	99.80%	0.18%	9,895,622
20	North Dakota	99.80%	0.18%	723,393

4 Conclusion

Despite clear progress in closing the Digital Divide, and an increase in broadband penetration from 2011 to 2012, a large disparity still exists between rural and urban counties. There was a significant gap (30.9%) in rural

[3] The complete table may be found at http://www.broadbandmap.gov/rank/all/state/percent-population/within-nation/speed-download-greater-than-0.768mbps-upload-greater-than-0.200mbps/ascending

[4] The percentage of households having availability at the federal broadband definition level is much greater than the percentage of households having availability at the minimum California standard of 6 mbps downstream and 1.5 mbps upstream. The latter is presented in the CPUC's California Advanced Services 2013 report, http://www.cpuc.ca.gov/PUC/Telco/generalInfo/CPUC+Reports+and+Presentations.htm

penetration compared to that of large urban areas. Less than half of rural households were connected to broadband in 2012. About a quarter of that difference was due to lack of broadband access. Eight urban counties had penetration rates greater than 80%, whereas seven rural counties had penetration rates below 50%.

In addition to the large urban-rural discrepancy, we saw low penetration rates (below 50%) in some urban census tracts. Lower income sections of Los Angeles and Sacramento stood out compared to those in San Francisco and San Diego, which had higher overall penetration rates.

Compared to the U.S. overall, California had more connected households on a per household basis, but compared to other states, California ranked 14th in terms of broadband availability. But California's total connected population exceeded the combined total of the top 5 states.

5 Technical Notes

Overview of Data Sources

This report draws from three primary data sources: the June 30, 2012 edition of the FCC Form 477, June 30, 2012 geographic Internet availability data collected by the California Public Utilities Commission and a compilation of publicly available demographic information from the United States Census Bureau. Each of these data sources is described in detail in this section.

FCC Form 477 (June 30, 2012)

The purpose of Form 477 is to "gather standardized information about subscribership to Internet access services in the fifty states".[5] Twice yearly, broadband Internet providers of various technology types report the number of subscribers they serve, both commercial and residential, at the census tract level. The FCC uses "reportable connection" to describe an address where Internet service is available for use by occupants of a household. For this report, we equate "subscription" with a reportable connection. The FCC's Form 477 data also shows subscriptions by broadband connection speeds. This section summarizes some of the statistics on broadband subscriptions in California. This information can be used to determine the broadband penetration rate – the ratio of residential broadband subscriptions to households in a census tract. It also can be used in conjunction with broadband availability data to derive a broadband adoption rate-- the ratio of residential broadband subscriptions to households which have geographic access to broadband services in a census tract.

Subscriber data submitted to the FCC by broadband service providers are confidential, so anything we report in this paper must preserve that confidentiality. More information about the FCC Form 477, including collection methods and reporting dates, can be found by visiting their website: http://transition.fcc.gov/form477/

[5] http://www.fcc.gov/encyclopedia/internet-access-services-reports; http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-321076A1.pdf

Broadband Availability Data (June 30, 2012)

The California Public Utilities Commission (CPUC) collects data regarding the *availability* of broadband services, pursuant to the State Broadband Initiative administered by the National Telecommunications and Information Administration and funded by the American Recovery and Reinvestment Act. The CPUC collects this geographic coverage data twice yearly, using the same time intervals as the FCC's Form 477, allowing for the two datasets to be compared directly. Rules for what constitutes "availability" are described in the Notice of Funds Availability for the State Broadband Initiative program[6]

The CPUC has contracted with the Geographical Information Center and the Center for Economic Development at California State University, Chico to assist with data compilation, processing, and interpretation.

For more information about the State Broadband Mapping Program, visit the CPUC's website at:
http://www.cpuc.ca.gov/PUC/Telco/Information+for+providing+service/Broadband+Mapping/index.htm
To examine the most current edition of availability data without the need for specialized software, visit the California Interactive Broadband Map: http://www.broadbandmap.ca.gov/

Household Data

The United States Census Bureau is the federal agency responsible for collecting demographic and socioeconomic data for public use. The decennial census fully surveys the population to obtain information about population, households, and race, while more in-depth economic and social statistics are collected by the American Community Survey, using smaller sample rates.

In this report, we use the CPUCs household estimates for June 2011 and June 2012 based on the California Department of Finance estimates for January 2011, 2012 and 2013. For more information about the US Census and projections made by the California Department of Finance, visit the Demographic Research Unit's page at:
http://www.dof.ca.gov/research/demographic/overview/

To compare California adoption with the US adoption, this report uses one year American Community Survey estimates for the California and US.

FCC Form 477 Data

Detailed information regarding FCC Form 477 data can be found in the "Technical Notes" section of "Internet Access Services as of 6/30/12", published by the Wireline Competition Bureau of the FCC's Industry Analysis and Technology Division.

To view the report, visit the FCC's website: http://www.fcc.gov/reports/internet-access-services-63012

To learn more about how Form 477 is collected, visit the FCC's *Form 477 Resources for Filers* page:
http://transition.fcc.gov/form477/

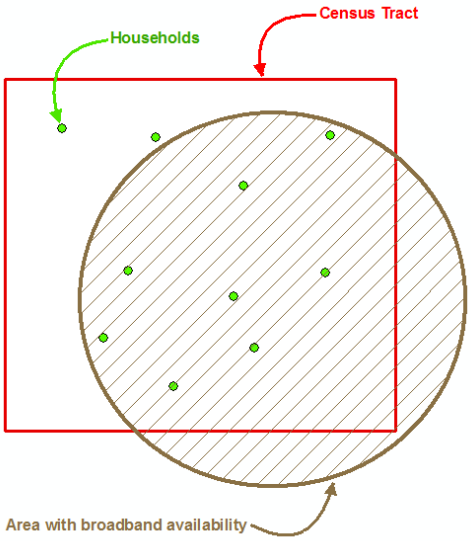
[6] http://www.ntia.doc.gov/federal-register-notices/2009/notice-funding-availability-nofa-state-broadband-data-and-development

Graphical Example of Adoption Rate vs. Penetration Rate

A theoretical internet service provider claims to have service available in the circled area below. The square area shows the border of the census tract where the service is offered. There are ten households in the census tract, but only eight of those households have access to broadband. Based on this, we calculate broadband availability in this example to be 8 households.

Assume that the internet service provider in this example has only 5 households in its service area subscribing to it service. The adoption rate would be 5 households subscribing to service divided by a total of 8 households where service is available (within the circle), or 62.5%. The penetration rate is slightly lower. We calculate penetration rate to be the number of households subscribing to internet service divided by the total households, which in this case is ten. Thus, the penetration rate is 50%.

Example of Broadband Metrics



Adoption Rate: 5/8 = 62.5%
Penetration Rate: 5/10 = 50.0%