What's New with Release 2.3 of the California Interactive Broadband Map

In order to improve map accuracy, as well as provide more information to the public and policy makers, we have made a number of enhancements to the interactive map:

- **Round 9 data updated**
  - This release has broadband provider data as of December 31, 2013. Compared to the June 30, 2013 data set (i.e., Round 8), this data set restores some of the fixed wireless provider areas that had been invalidated due to lack of customer data.
- **Adjusted served**
  - As an additional tool to assist CASF applicants, we have added two layers under the "Broadband Availability" menu:
    - Combined Served Under-served Un-served - CA Adjusted, and
    - Mobile Wireless Served Under-served Un-served - CA Adjusted
  - How are these different from the "CA Definitions" layers? The "CA Definitions" layers rely on providers' maximum **advertised speeds as validated by Communications Division (CD)** for determining served/under-served/un-served areas. For more information on the validation process and data sets used for validation, please refer to CA_Methodology_2014_03_28.pdf
  - The "CA Adjusted" layers use the same validated maximum advertised speeds for wireline and fixed wireless as in the "CA Definitions" layer, but for mobile we replaced maximum advertised speeds with interpolated mobile results from field testing conducted at 1,990 locations throughout the state by CD contractors. This results in a map reflecting more conservative and higher probability of **actual** speed and coverage. For more on the interpolation model used, go to the end of this document.
- **Changes to menu items**
  - Drill tool
    - Removed the 1st-3rd field test results for mobile providers and replaced them with 4th and 5th field test results conducted in the Fall of, 2013 and Spring of 2014, respectively.
    - Updated the grant application data.
  - Layer tool – Mobile test results
    - Removed the 1st-3rd field test results for mobile providers and replaced them with 4th and 5th field test results.
  - Layer tool – Broadband availability
    - Added two new layers, which use an adjusted mobile test result for creating a "served" map. The adjustment uses the mean throughput minus one standard deviation for each location as the basis for GIC

interpolation (kriging). The adjusted map creates a more reliable estimate of served areas than the mean interpolated, which was used in the past.
    - Combined Served Under-served Un-served – CA Adjusted
    - Mobile Served Under-served Un-served – CA Adjusted
- Broadband grants
    - CASF Approved Projects has been updated to include projects recently approved by the CPUC
- CalSPEED and Public Feedback layers are updated with data through July 31, 2014.

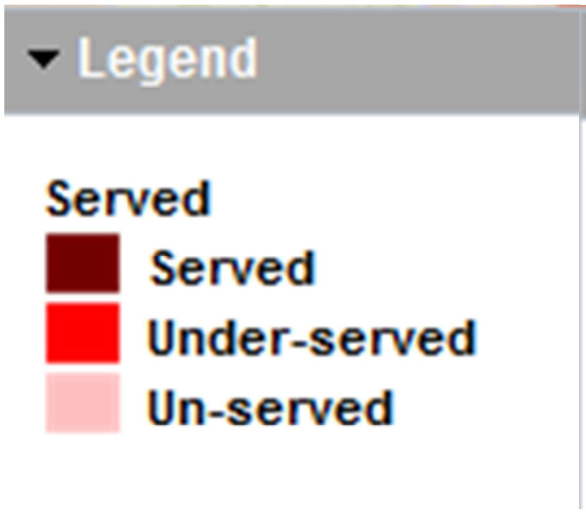
More on the "CA Adjusted" layers

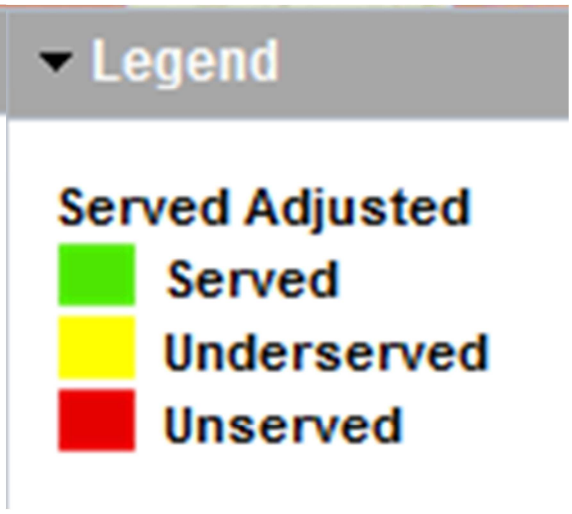
As part of our effort to validate mobile coverage and speeds across the state, we conduct a semi-annual mobile field test by taking smartphone and data card measurements at 1,990 locations for the four major providers (Verizon Wireless, AT&T Mobility, Sprint, and T-Mobile). For each provider/location combination, we run 40 tests for both upstream and downstream using both a smartphone and datacard. Those results are averaged to calculate a mean (average) throughput for upstream and downstream. We feed those measurements into a geo-spatial model to create a continuous coverage map using a method called "kriging." In the past, the kriging model relied on the mean upstream and downstream speeds, but we realized that using the mean can be misleading, because the variation – even at a single location – can be huge. So, in order to come up with a more conservative (and realistic) estimate of coverage and speed, we calculated the standard deviation for each location and each provider and subtracted one standard deviation from the mean (again, by location), and used that as the basis for kriging. The resulting footprint of "served" level population coverage was smaller than that of the mean. For tribal and rural areas in particular, we observed many areas going from "served" to "under-served," or even "un-served." Here is an example:

The "served" map uses the fastest available upstream and downstream combination available from a provider to determine "served" status, i.e. combined 1.5 megabits per second upstream and 6 megabits per second downstream or greater. The difference between the two "served" images come from the "CA Definitions" version being maximum advertised and "CA Adjusted" version being an interpolation of measurements taken in the field. Note that the "CA Definitions" image uses shades of red to denote served, under-served, and un-served areas, whereas the "CA Adjusted" uses a traffic light color scheme. Notice how much larger the under-served areas appear to be in the "CA Adjusted" image.

Mobile Only images (no fixed technologies are included)

CA Definitions (max. advertised speeds) **CA Adjusted (interpolated mobile speeds)**





Now, let's take a specific test point and look at the mean and standard deviation for downstream speeds for all four mobile providers. This data comes from the Fall 2013 mobile field testing.

Mobile test location ID: 2303 (Fall 2013 test results)

Provider	In/Out coverage	Downstream (mean, in mbps)	Standard deviation (mbps)	Mean minus 1 standard deviation (mpbs)
AT&T Mobility	In	4.894	1.981	2.913
Sprint	Out	0.080	0.057	0.023
T-Mobile	Out	0.000	0.000	0.000
Verizon Wireless	In	2.163	1.501	0.662

For this location, none of the providers showed results that qualified as "served" for the downstream part of the definition. Reducing the mean by one standard deviation increased the likelihood of a user getting that adjusted speed.

Note on resolution differences

The resolution of the kriging model is 1 kilometer, whereas the resolution of the maximum advertised speeds is often smaller – down to the census block. The difference in resolution between the two layers, "CA Definitions" (maximum advertised) and "CA Adjusted" (incorporating mobile interpolated as opposed to mobile maximum advertised) may create contradictory indications of "served" status for a particular location (latitude / longitude combination). The interpolation model we use provides a birds-eye view of likely speed and coverage, but it is not accurate down to a specific address.