



MOBILE WIRELESS DRIVE TEST INVENTORY REPORT

Supporting the New Hampshire Broadband Mapping & Planning Program's Broadband Availability
Mapping for the State of New Hampshire

5/23/2014

Introduction

The New Hampshire Broadband Mapping & Planning Program (NHBMPP) began a comprehensive five-year initiative in 2010, with the goal of understanding where broadband is currently available in the state, how it can be made more widely available in the future, and how to encourage increased levels of broadband adoption and usage. The Program was an American Recovery and Reinvestment Act of 2009 (ARRA) project funded through the National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce. The NHBMPP was managed by the New Hampshire Geographically Referenced Analysis and Information Transfer System (NH GRANIT) within the Earth Systems Research Center at the University of New Hampshire (UNH), and was a collaboration of multiple partners. These included the New Hampshire Office of Energy and Planning (OEP), the New Hampshire Department of Resources and Economic Development (DRED), University of New Hampshire Cooperative Extension (UNHCE), University of New Hampshire Information Technology (UNHIT), and the state's nine regional planning commissions (RPCs).

At the state level, the NHBMPP was tasked with mapping where broadband is currently available, determining how it can be made more widely available in the future, and encouraging increased levels of broadband adoption and usage. This was accomplished by collecting data from all active service providers on the technologies and speeds they offered on a semi-annual basis, processing that data into a series of coverage maps, and using the maps to identify areas in the state considered to be underserved or unserved. NHBMPP also offered broadband planning, technical assistance, and capacity building services to a wide range of groups and organizations throughout the state.

The NHBMPP undertook a suite of activities in an effort to verify and refine the data submitted by providers. A significant verification activity, conducted in the summer of 2012, was a statewide mobile wireless drive test inventory. Additional verification activities include collecting speed tests and user surveys via the program website, as well as working directly with the internet service providers in reviewing their coverage footprint. Collectively, these data informed the NHBMPP's ongoing efforts to map and verify broadband availability in the state.

The drive test inventory was conducted using cell phones from each of the five mobile wireless providers delivering service in New Hampshire, including AT&T, Sprint, T-Mobile, US Cellular, and Verizon Wireless. Using specialized software running on phones from each carrier, data points were collected along all Interstates, US Routes, and State Highways in the state - over 3,500 miles of roadway. From these data, the signal strength surface was generated to identify areas of the state where the signal strength was not adequate to transmit data information over the cellular network.

Methodology

In order complete the drive test inventory project the following tasks were completed:

- Android cellular phones (Android OS 2.1 and/or higher; GPS capability) with data plans from each of the five mobile wireless carriers were rented from RovAir. The decision was made to rent the phones versus purchasing them for a variety of reasons:
 1. Managing the phone accounts with 5 separate providers would require individual billing as well as separate maintenance plans.
 2. Several of the phone carriers required a voice plan even though the testing only needed a data plan. The additional voice cost far exceeded the cost for renting.
 3. Seasonal deactivation of the cell phones was examined to minimize the project cost. However not all carriers allowed for deactivation and for those that did, corporate customer service would need to be involved.
- Drive test software from QoS Solutions (QMapper, QWifi and QPerf) was licensed and installed on each phone (see Figure 1).
- Drive routes for data collection along Interstates, US Routes, and NH State Highways were mapped out using Google maps and traditional GIS software (see Figure 2). Routes were designed to be approximately 4-6 hours in duration. The Google maps and directions were also used as a guide when the routes were driven.
- Routes were driven and data collected. Photos of landmarks were also collected (see Figure 3).
- Finally, analysis of drive test data against mobile wireless coverage information was conducted to identify areas where data service was limited (see Figure 4).

Figure 1: Cell phone data collection setup

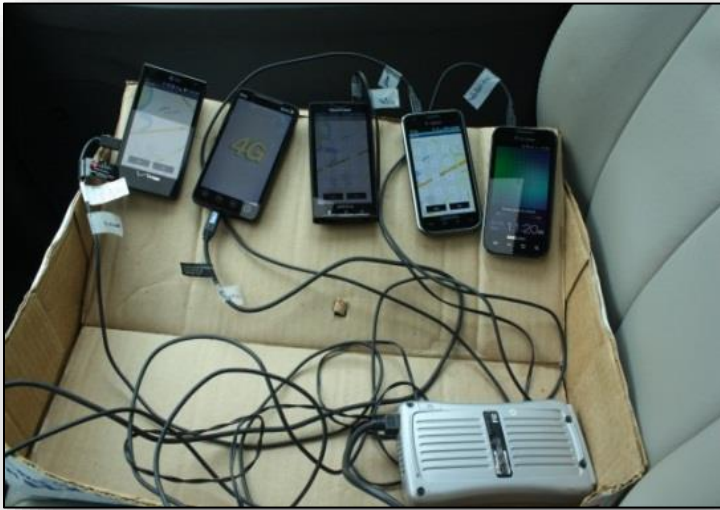


Figure 2: Google mapped drive plan

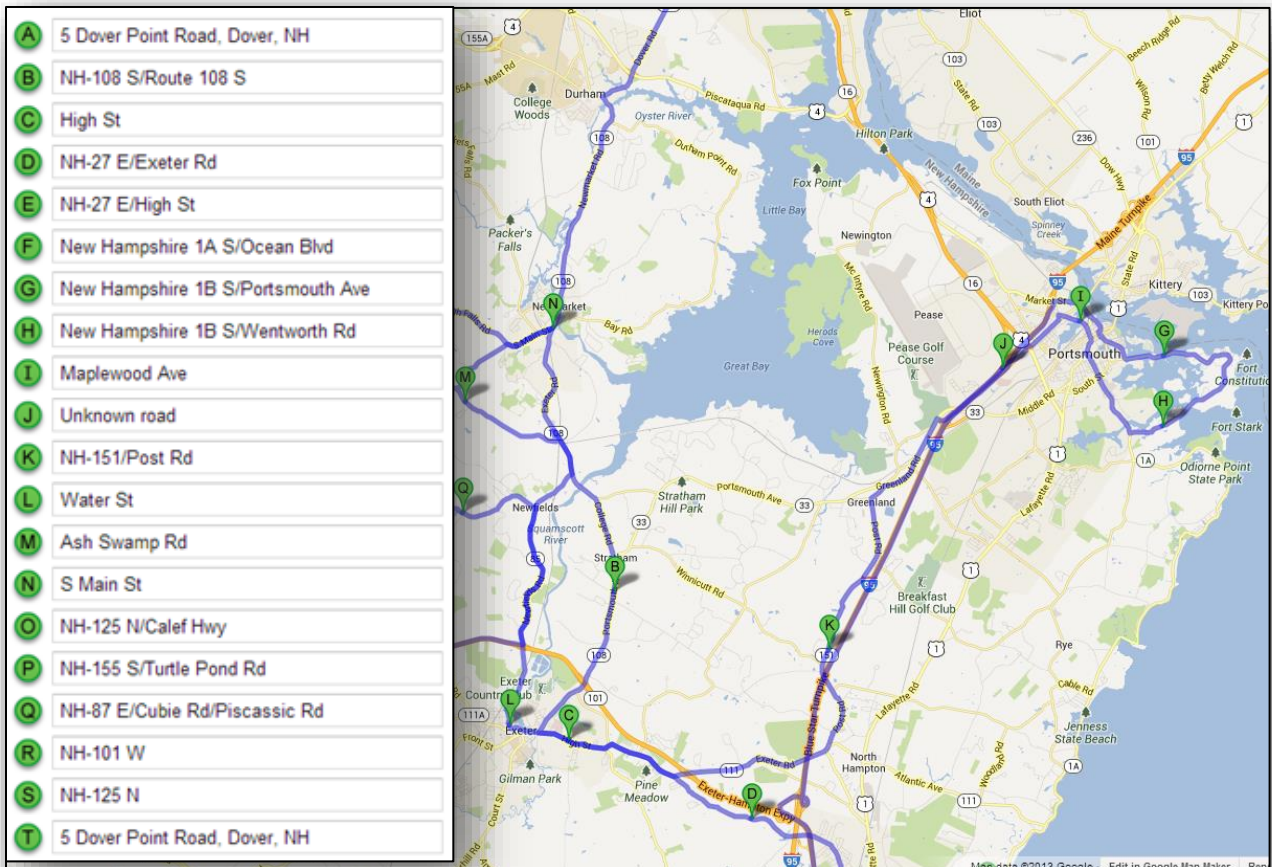
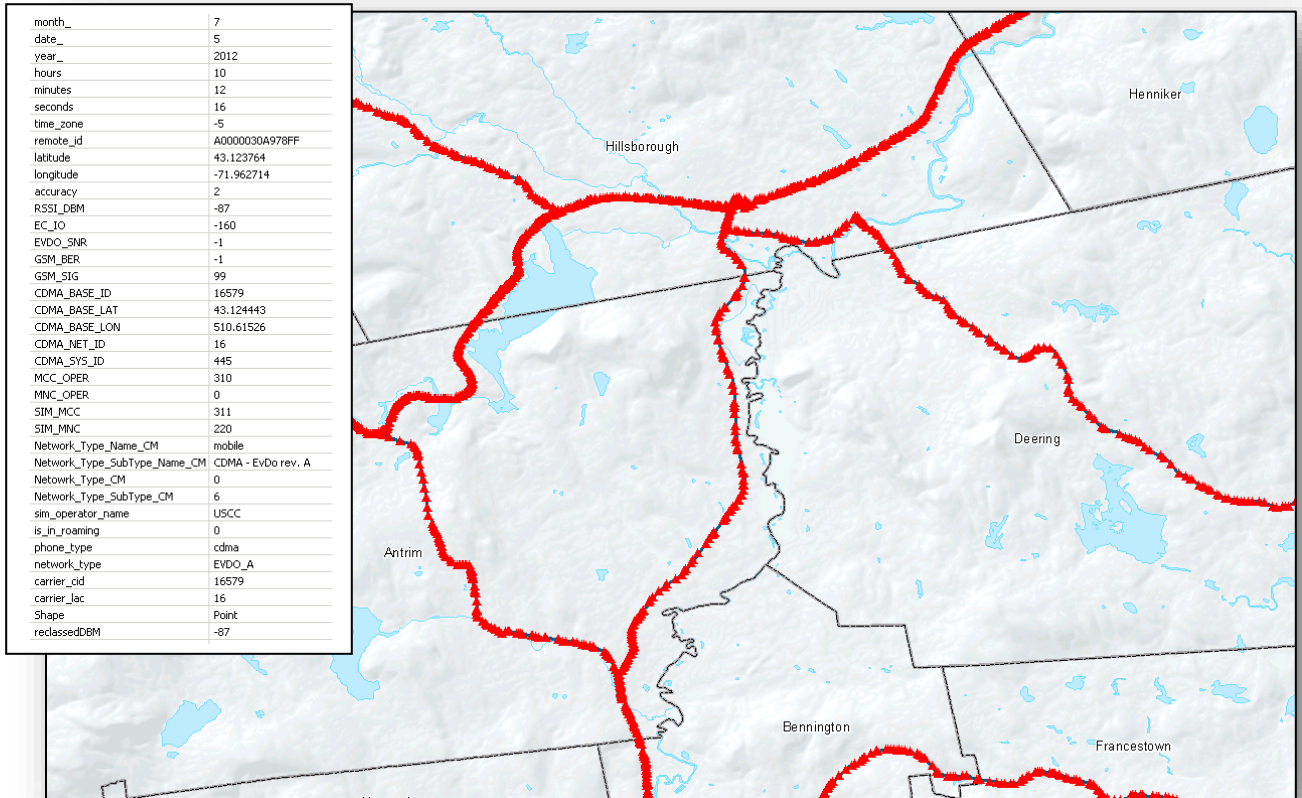


Figure 3: Field photos from data collection



Figure 4: Raw data points from US Cellular



Results

The data collection over 3,500 miles of roadways yielded 700,000 data points. These data were then converted into a signal strength surface for each of the 5 providers. Figures 5-9 display the signal mobile wireless signal strength surfaces that resulted from the analysis.

Figure 5. AT&T

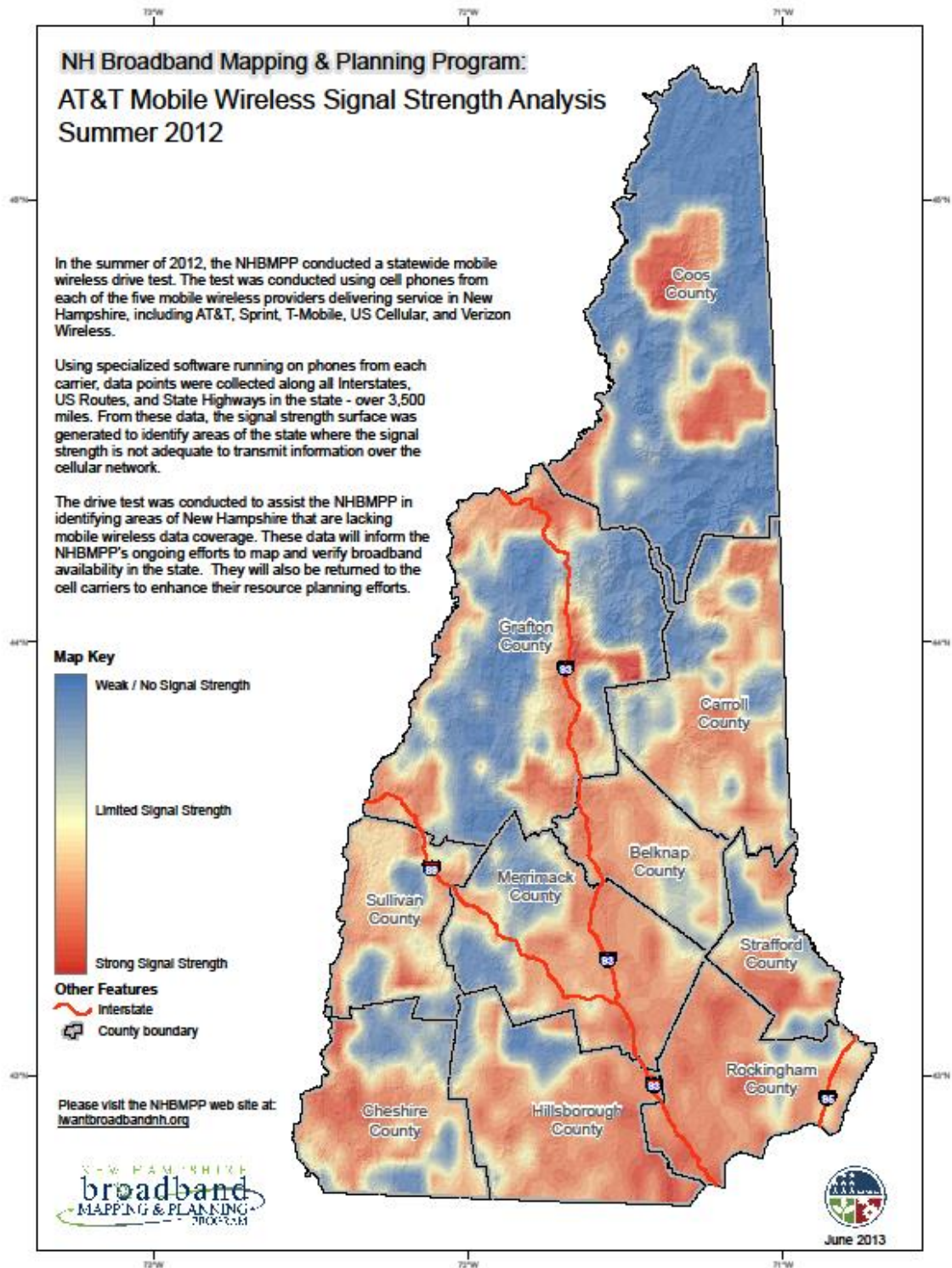


Figure 6. Sprint

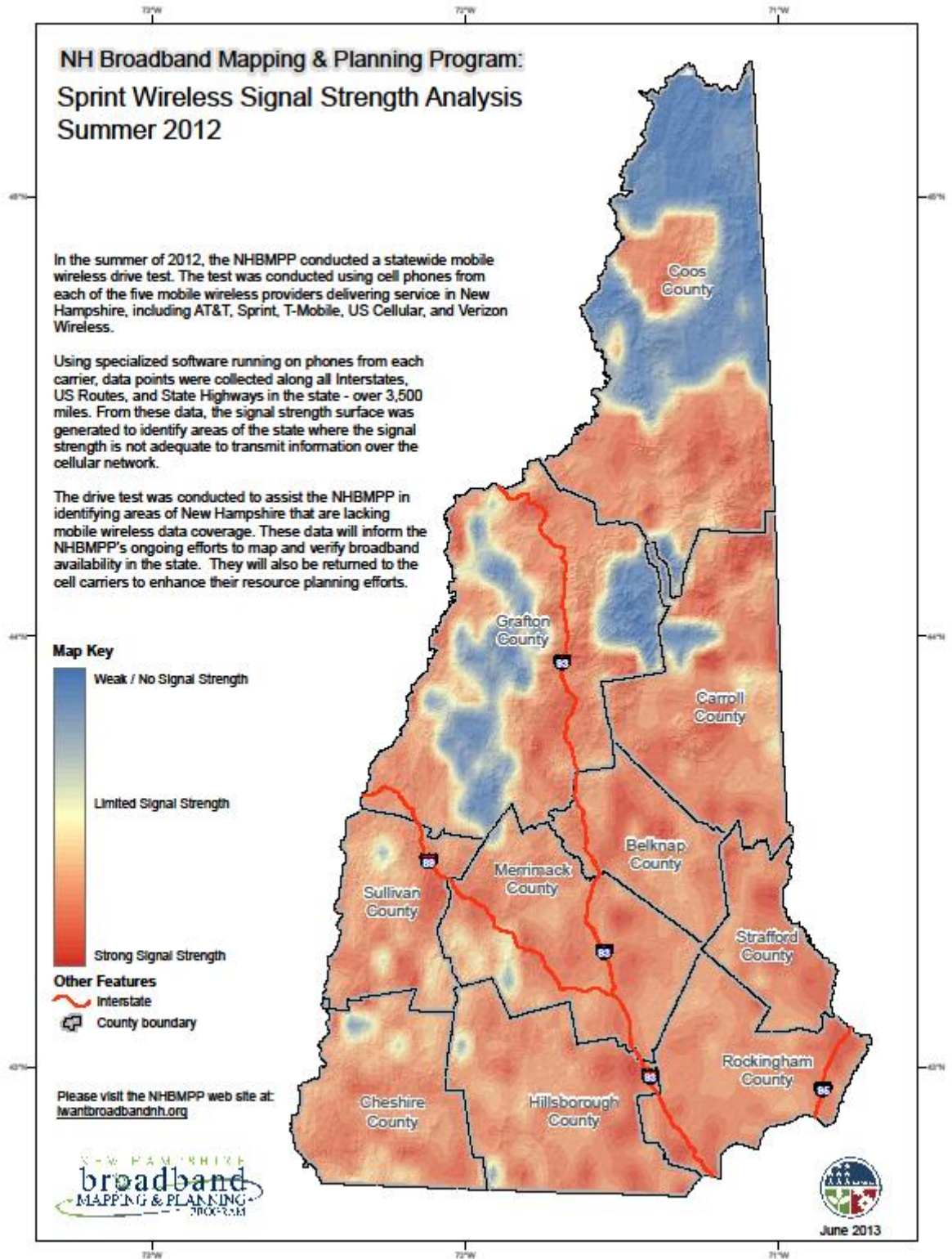


Figure 7. T-Mobile

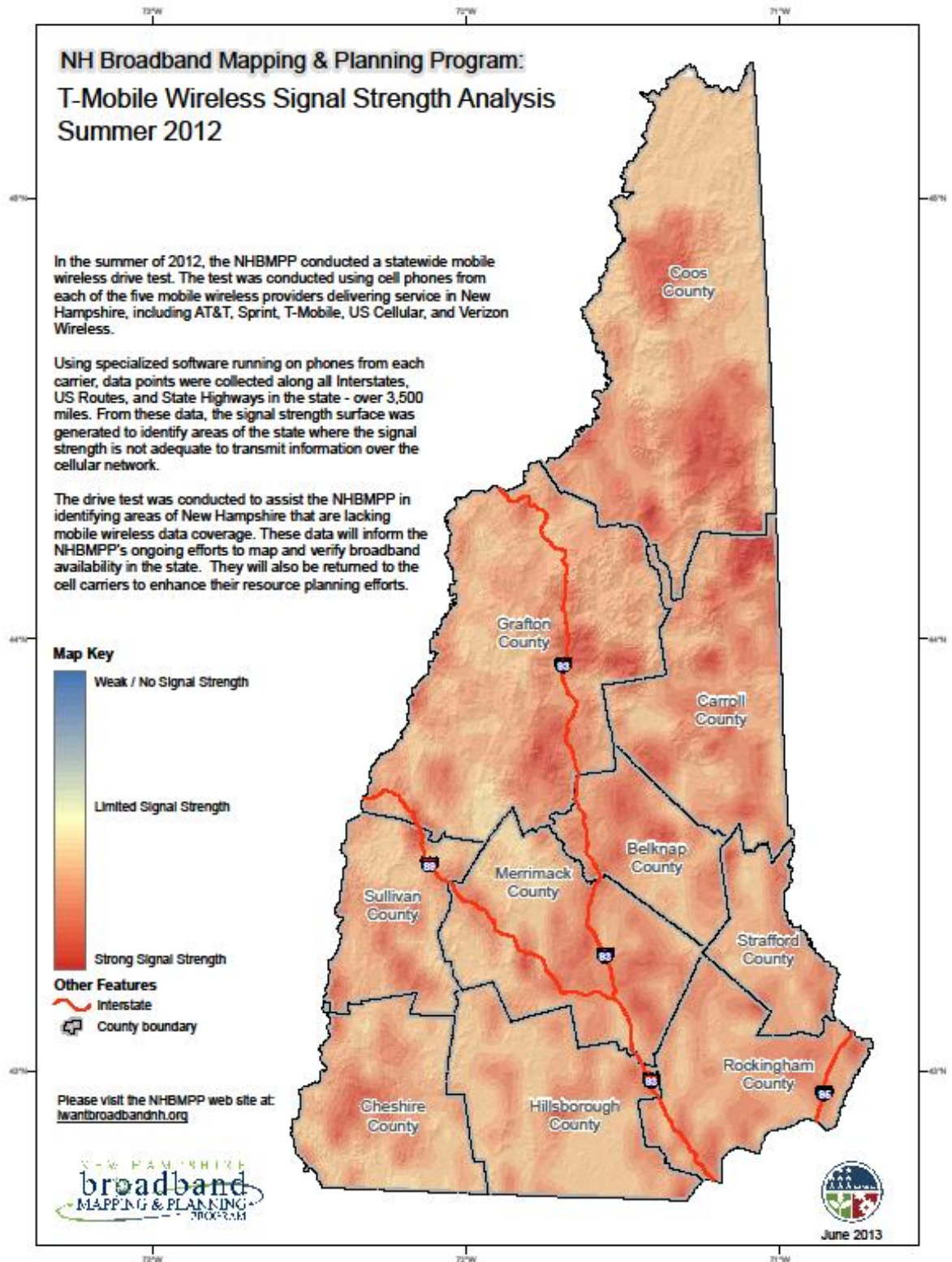


Figure 8. US Cellular

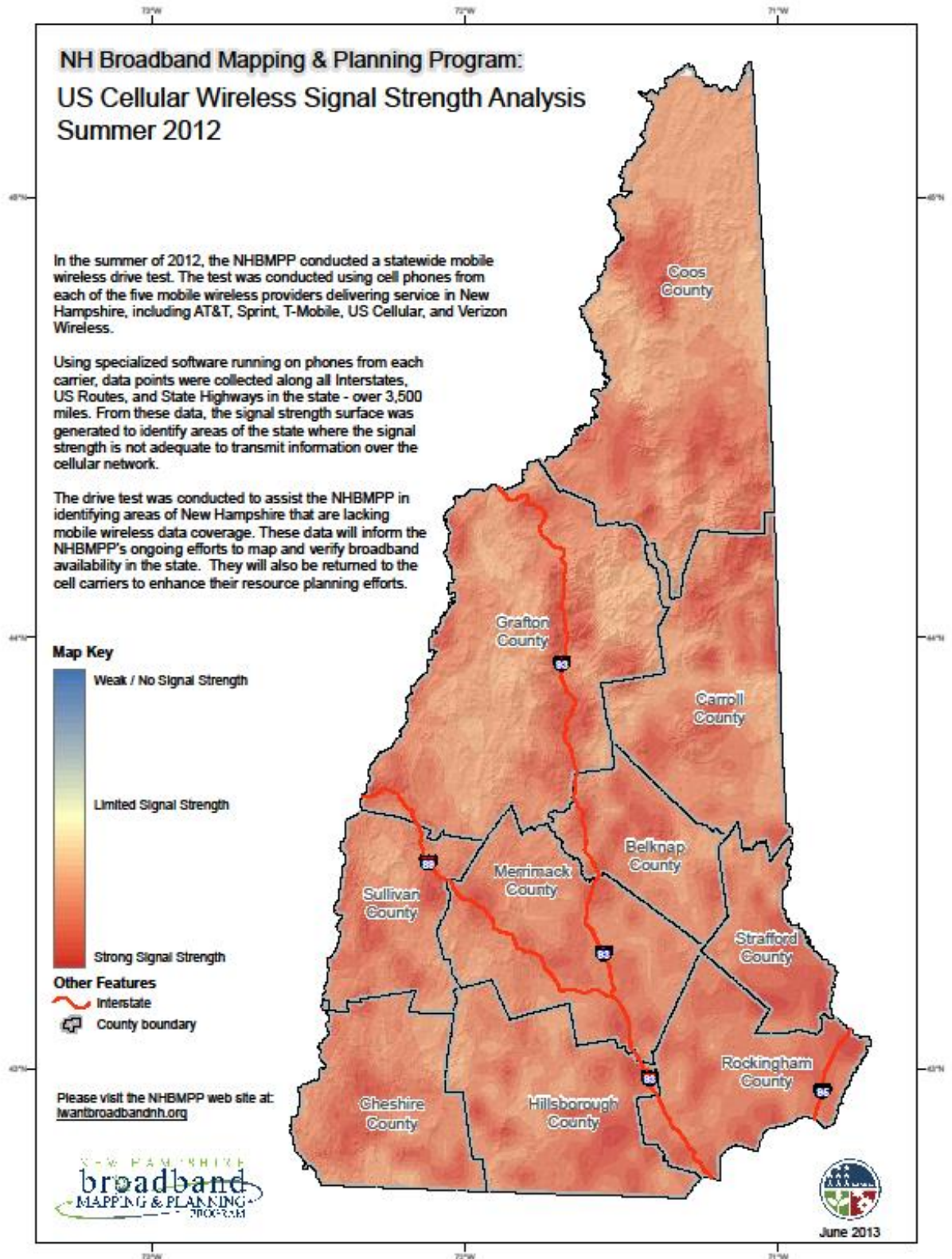
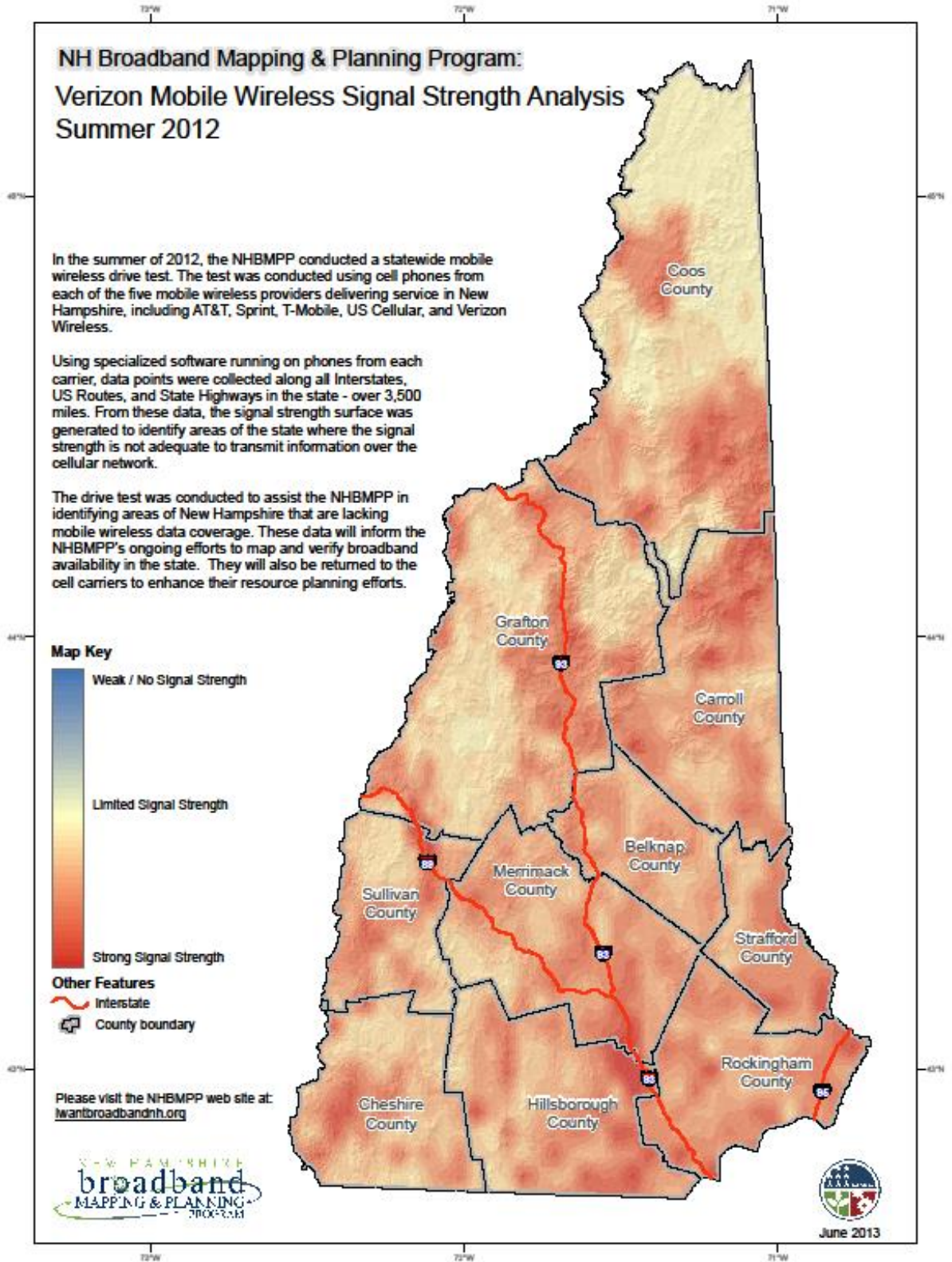


Figure 9. Verizon Wireless



Additional Information

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