

UC Berkeley Project Captures Real-Time Traffic Information Using GPS Enabled Mobile Devices



Feb 15, 2008, News Report

Photo: The complexity of San Francisco Bay area traffic increases need for real-time travel information.

Nokia and UC Berkeley researchers last week tested technology that could soon transform the way drivers navigate through congested highways and obtain information about road conditions. One hundred cars equipped with the GPS-enabled Nokia N95, and driven by students from the University of California, traveled a 10-mile stretch of highway near San Francisco to show how real-time traffic information can be collected from the GPS feed, while preserving the privacy of the devices' owners.

The experiment was carried out to test the traffic data collection and aggregation system, while studying the trade-offs between data accuracy, personal privacy and data collection costs. The software aggregating the GPS feeds immediately disassociates that data from an individual device and combines it with the general stream of traffic data. To protect privacy, all data is anonymous and aggregated, and protected by banking-grade encryption

During the experiment, special software on the mobile devices periodically sent anonymous speed and location readings from the integrated GPS to servers. The feeds were then combined to create a real-time picture of traffic speeds and projected travel times.

"Mobile device users control the service. If an individual does not want their device to transmit position data they turn off the feed from their GPS," stated Quinn Jacobson, research leader at Nokia Research Center, Palo Alto.

"There are mobile device-based systems out there that can collect data in a variety of ways, such as measuring signal strength from towers and triangulating position, but to our knowledge, this is the first demonstration of this scale using GPS-enabled mobile devices to provide traffic related data such as travel times, and with a deliberate focus on critical deployment factors like bandwidth costs and personal privacy issues," said Thomas West, director, UC Berkeley's California Center for Innovative Transportation.

The researchers believe that fewer than 5 percent of drivers need to contribute location

data for the system to be effective on any particular highway.

For state transportation agencies such as The California Department of Transport (Caltrans), tapping into the vast network of mobile phones on the road could one day remove the need to invest in expensive infrastructure to obtain traffic information as well as greatly expanding the coverage of such services.

In the USA alone congestion causes 4.2 billion hours extra travel every year and the purchase of extra 2.9 billion gallons of fuel for a congestion cost of USD 78 billion. With the number of vehicles on the road increasing rapidly around the world a cost-effective method of travel planning could help drivers make smarter decisions about which routes to take, the researchers say.

The project brings together research teams from the Nokia Research Center (NRC) in Palo Alto and from UC Berkeley, interacting through UC Berkeley's California Center for Innovative Transportation (CCIT). These teams are developing the algorithms, software and architecture of this GPS-based traffic monitoring system.

The project is supported by a USD 186,000 grant from Caltrans. Additional support comes from the National Science Foundation, Nokia, Tekes, Rutgers University's WINLAB, the University of California Transportation Center and the Volvo Center of Excellence for Future Urban Transport at UC Berkeley's Institute of Transportation Studies.