ADDITIONALLY SELECTED TECHNOLOGIES 2011

Anonymous Wireless Address Matching (AWAM) for Travel Time Data Collection

How the Technology Works

Each Bluetooth device has a unique identifier called a Media Access Control (MAC) address, which the device transmits within a short range.

"A motorist with a Bluetooth-enabled device drives by a road sensor, and the sensor reads the MAC address," says Darryl Puckett, a TTI research scientist investigating uses of Bluetooth technology. "Farther down the road, another sensor reads the MAC address again, and the system matches it to the first reading." Software then determines how long it took to travel from one reader to the other and calculates the average speed.

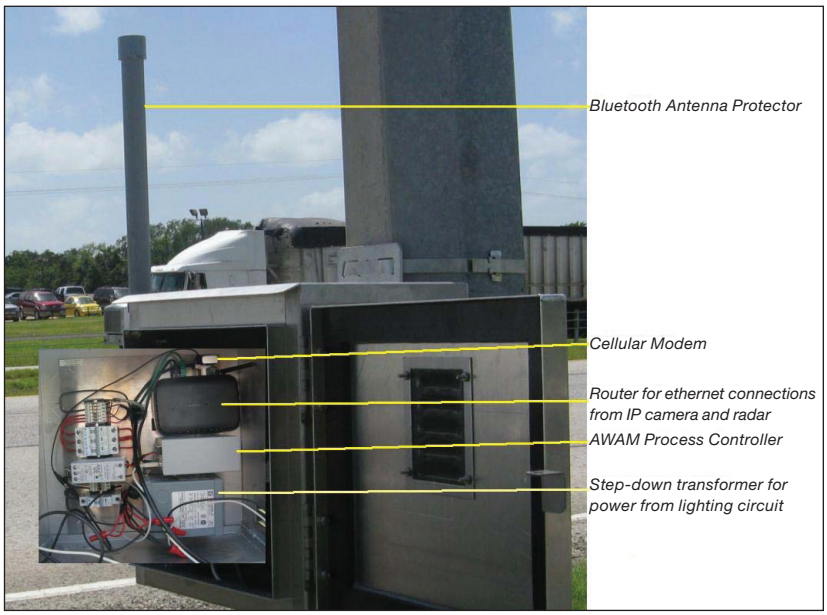
Privacy is an important concern. MAC addresses are not directly associated with a specific user and do not contain any personal information. Users can also disable the Bluetooth function of their device to prevent it from being read.

The benefits of this anonymous wireless address matching (AWAM) system are many. A large percentage of the population has Bluetooth devices, so the technology is easy and nonintrusive for motorists. The roadside readers are low cost and low maintenance, using standards-based, non-proprietary equipment and protocols.

The Challenge

In our urban areas, millions of motorists drive our roadways every day, often with long delays. Travel time data can help commuters choose when and what route to travel and help planners identify congested segments for operational or infrastructure improvements. Traditional methods of determining delay — usually by visual estimates or motorist survey — are unreliable.

Several years ago, researchers at the Texas Transportation Institute began experimenting with the use of Bluetooth® technology as a viable, cost-effective alternative to traditional means of collecting travel time information.



An AWAM sensor field installation. The equipment installed on IH45 to Dallas was deployed to monitor traffic during a hurricane evacuation event.

Research in Action

The on-site testing for this technology began in Fall 2008, on a 3.5-mile arterial segment on U.S. 90A in Houston. The first fully functional segment was in place in March 2009. Currently, 14 sensors span 262 directional miles from F.M. 1488 to Streetman, TX, on IH-45 to IH-20 in Dallas, and real-time speed data are displayed on the Houston TranStar website (http://www.houstontranstar.org/). AWAM data are displayed to adjoining Automatic Vehicle Identification information on the website, creating a seamless view for the public. The equipment installed on IH-45 to Dallas was deployed to monitor traffic during a hurricane evacuation event.

In Houston's city limits, 20 sensors installed in west Houston cover 48 directional miles along local arterials. This data are also being displayed on the Houston TranStar website. The region's jurisdictions plan a combined 450 installed sensors covering 487 linear miles on freeways and major arterials. Build-out for this phase should occur during the first quarter of 2011.

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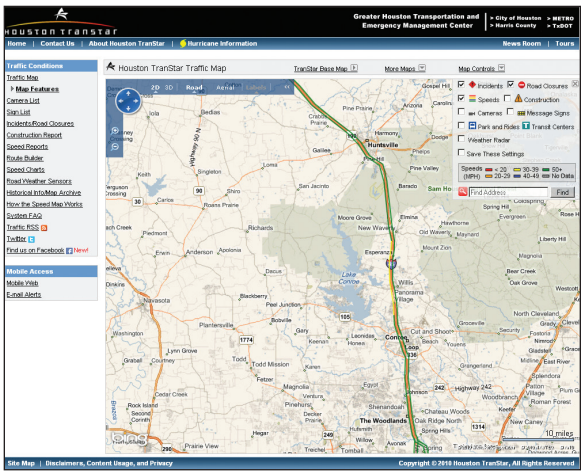
The anonymous wireless address matching (AWAM) concept for travel time data collection.

What are the Benefits of Anonymous Wireless Address Matching (AWAM)?

- Low cost, standards-based, non-proprietary equipment and protocols.
- Easy, non-intrusive field installation and maintenance.
- Large penetration of probe devices.



AWAM data displayed on Houston TranStar website.

Research Results

The results of the research and development provide a full, end-to-end solution for wireless address matching and provide the following features.

- Roadside equipment package and software for reading and forwarding wireless addresses.
- Host software for calculating real-time and historical travel time and speed data.
- Data analysis package for viewing real-time and historical data graphically.
- Travel time and speed web display for use in traffic management and traveler information system applications.

The technology offers a very cost effective solution to furnish data for providing travel time information to not only the public agency that deploys the equipment, but also to travelers that might need or wish to know the status of the roadways.

Implementation Facts

The cost for an average unit installation for the AWAM field processor is $3,500 using existing infrastructure (cabinet, AC power, etc.). For a rural location, a cost of about $8,000 might be expected for solar powered deployment where power is unavailable. Of course, right-of-way access would be required. The physical installation takes less than one-hour per sensor with existing infrastructure and can be deployed to the website within minutes.

The product is endlessly adaptable. It can be used anywhere there is either sun or power and enough space for a signal cabinet or a pole mount. Any organization of any size can use it at virtually any location, and the cooperative use such as the Houston TranStar website gives the public a vital 'one stop shop' for travel information.

Resources

Houston TranStar website:
http://www.houstontranstar.org/

TTI's AWAM website:
http://ttihouston.tamu.edu/bluetooth/

"I see this technology as an exciting, innovative way to obtain traffic information in places where we would not otherwise be able to gather data because of the cost. Other technologies can be up to eight times more expensive than using Bluetooth technology. In some cases this is just cost-prohibitive."

David Fink, TxDOT transportation operations engineer with Houston TranStar

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