



## BlueMAC's Bluetooth® Data Proves a Useful Tool for ATSPM

*The following is a preview of the paper "Data Fusion of Bluetooth with Automated Traffic Signal Performance Measures" prepared by ITRE at North Carolina State University, March, 2018. Please contact [info@BlueMACAnalytics.com](mailto:info@BlueMACAnalytics.com) to receive the full paper.*

The Institute for Transportation Research and Education (ITRE) at North Carolina State University fused Bluetooth data captured by BlueMAC devices with Automated Traffic Signal Performance Measures (ATSPM). The objective was to determine how Bluetooth-based performance data from BlueMACs could be used in coordination with high resolution signal controller data obtained through ATSPM to further help agencies in signal maintenance and retiming efforts. It was found that Bluetooth data is a complimentary addition to ATSPM data providing certain advantages over other performance data sources for maintaining and improving signalized intersections, as well as making available additional useful information beyond what is provided by ATSPM.

Through the data set provided by the BlueMAC system and fused with ATSPM, ITRE was able to deliver:

- Turning movement percentage
- Approach demand profiles
- Travel time
- Speed
- Pedestrian delay
- Origin-destination Matrices

These measures are extremely useful for traffic engineers in effectively managing and improving their signalized intersection performance.

While ATSPM data is valuable without supporting Bluetooth probe performance data, the combination is a potent data set for traffic engineers focused on providing state-of-the-art management of signalized intersections.

### **"Bluetooth Units Are An Ideal Technology..."**

The study concluded that "Bluetooth units are an ideal technology for observation of travel times for the purposes of automated traffic signal performance assessment due to the following reasons:"

- 1) They provide high resolution raw data compared to other probe data providers (such as crowd-sourced data providers), which only provide post-processed, aggregated and smoothed data.
- 2) The travel times by probe data providers at rural and semi-urban areas usually are not provided between each pair of intersections.
- 3) Provides additional value for corridors with high midblock friction from crosswalks or driveways which ATSPMs alone cannot measure.

## **Data Gaps in ATSPM eliminated by BlueMAC**

Where third party probe data can sometimes stretch over several intersections, BlueMAC sensors can be located at each intersection giving agencies the ability to obtain intersection-to-intersection travel times and speeds, or intersection level travel times. In addition to performance measures that can be derived from high-resolution signal event data logged by controllers, travel time data provides an additional set of outcome assessment metrics for corridor performance.

To optimize the usefulness of Bluetooth probe data, collection probes need to be appropriately installed relative to each signalized intersection, ultimately delivering both intersection-level as well as corridor-level travel times. Additionally, Bluetooth probes can prove very useful in situations where other performance measurement methods do not provide coverage – such as metered freeway onramps.