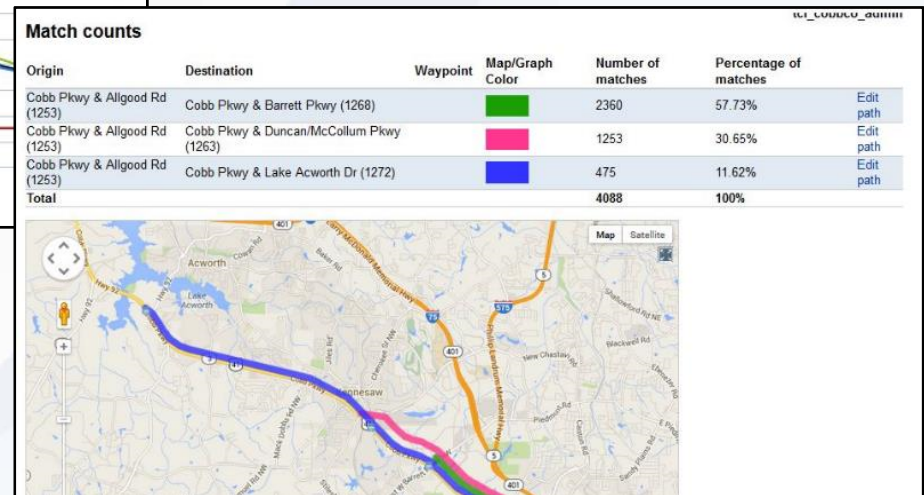
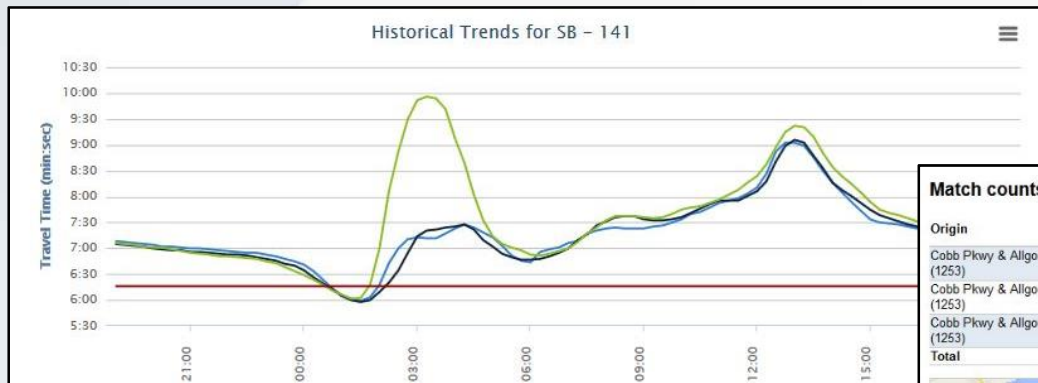


# Advances in Bluetooth Technologies For Travel-Times



Presented By:  
Paul Misticawi  
VP of Sales, TrafficCast

# Bluetooth Technologies for Travel-Times



- What is Bluetooth
- How are travel-times derived from Bluetooth devices
  - Turning Raw Data into Information
- Applications Using Bluetooth Travel-Times
- Using neighboring agencies Bluetooth devices
- Advancements in Hardware and Why
- How do you view and use the information
  - Sevierville, TN – Live Demonstration

# Bluetooth and MAC Address

- **Bluetooth** is an open wireless technology standard for exchanging data over short distances from fixed and mobile devices, creating personal area networks (PANs) with high levels of security.
- **Bluetooth** uses a radio technology called frequency-hopping spread spectrum and is in the 2.4 GHz short-range radio frequency band
- A **Media Access Control address (MAC address)** is a unique identifier assigned to network interfaces for communications on the physical network segment



# How Does Bluetooth Work w/ Bluetooth

**TRAFFICCAST**



WWW.TRAFFICCAST.COM

Servers



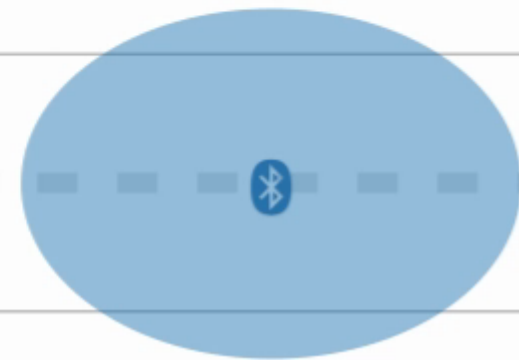
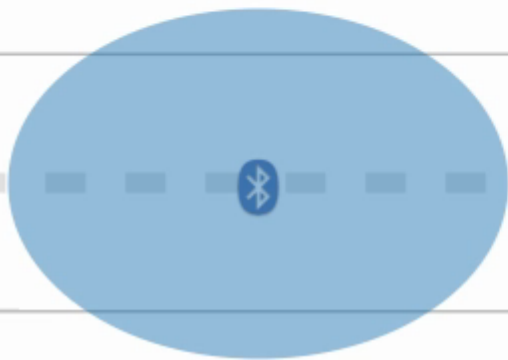
Timer

00:30 min/sec

BlueTOAD - A



BlueTOAD - B



# Data into Information

## Hardware

- AC or DC Power
- Ethernet and/or Cellular
- Stand alone or existing cabinet



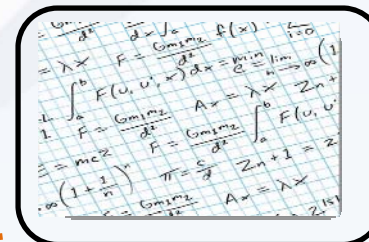
## Web Based Backend

- Real time speed and travel time information displayed on website hosted by TrafficCast
- Statistical data reports covering speed, travel time, origin/destination



## Filters/Algorithms

- Proprietary algorithms that smooth the data based upon road classes (i.e. arterial, expressways, etc.)
- Traffic engineering and data analysis that check to see if the data is accurate

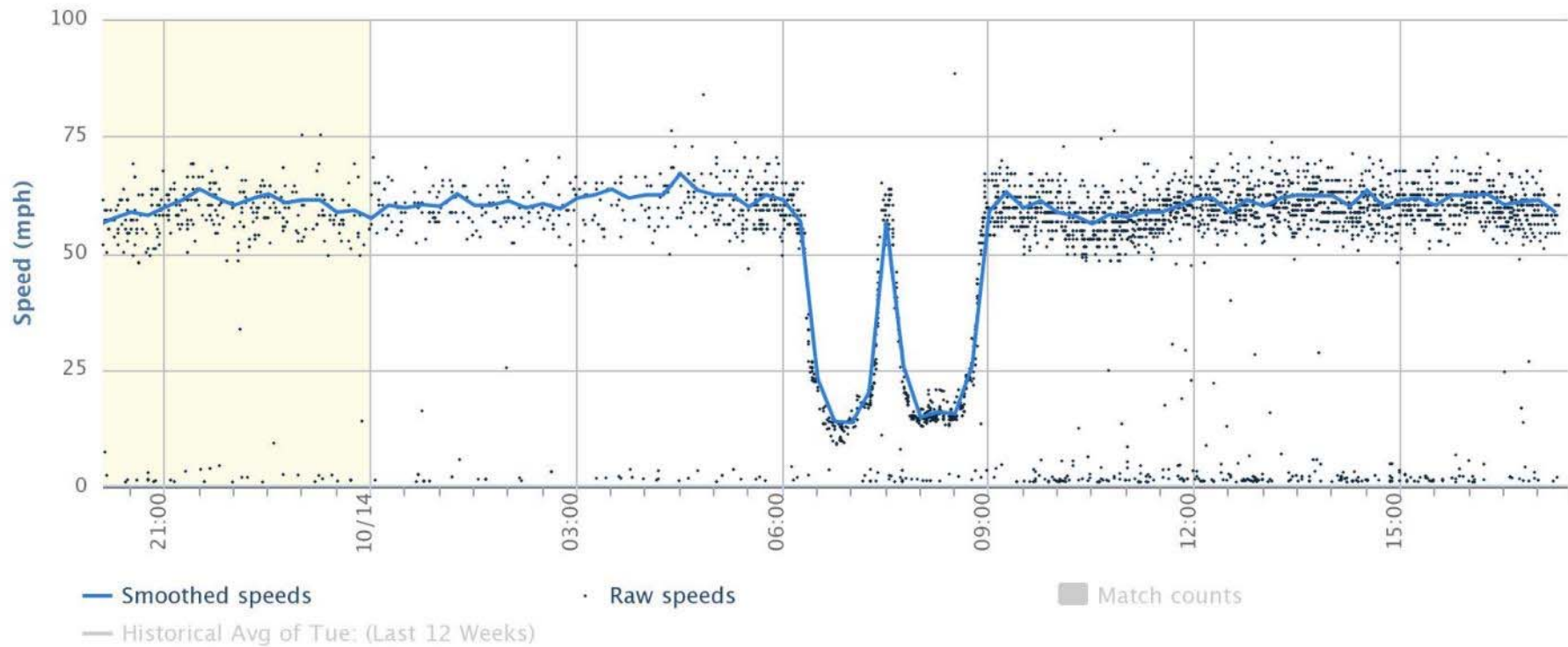




# Filters Out Data Outliers in Real Time

Smoothed (15 min) for Pair 16536: Zoo: I-894 NB N of Cold Spring to Cleveland

from 2014-10-12 17:22 to 2014-10-14 17:22



# Bluetooth Applications

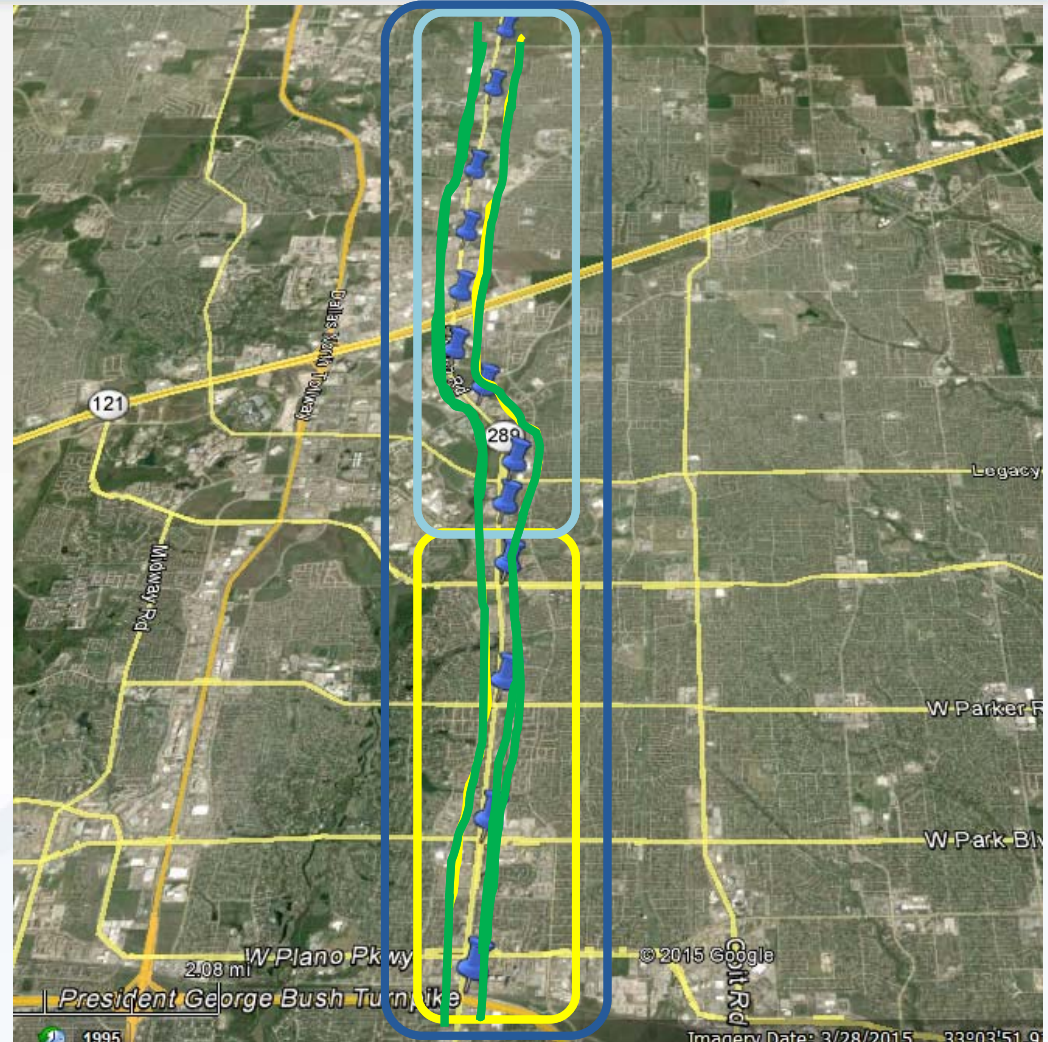
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- Arterial Travel-Times (operations, OD, message boards, before/after studies, adaptive analysis)
- Freeway Travel-Times (operations, OD, message boards)
- Performance Measures
- Work Zone Applications
- 511/Traveler Information Systems
- Planning/Modeling (OD)
- Incident Management

# Device Replication...Multi-Jurisdictional Sharing & Pairing

## Device Replication Feature:

- Multi-jurisdictional **sharing** of information made simple
- Server to server data exchange
- Copy and **pair** any Bluetooth device in real-time
- Allows users to expand their travel-time system at no cost





# Hardware Enhancements



**2010**

Stand Alone Processor



**2012**

Integrated Processor/Ant



**2016**

Dual Radio System

# BlueTOAD Spectra Goal



TrafficCast set forth to engineer a system that would detect the most samples per unit and most matches between units in the industry; far more than any Bluetooth and/or Wi-Fi system.

This would provide our partners accurate and reliable travel-times on lower volume roads and on non peak-hours, while also providing greater OD accuracy.

# BlueTOAD Spectra Technology

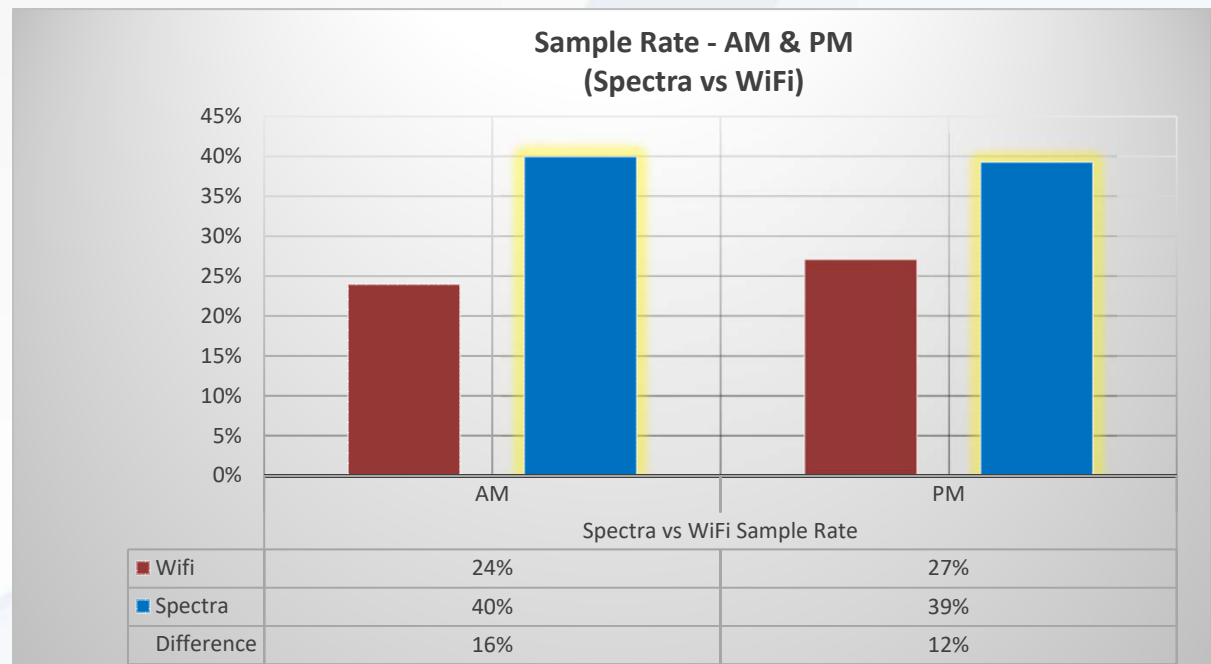


- New **Dual** Radio System
- Detection of Discoverable **AND** “Non-Discoverable” segments of Bluetooth signal.
- Ensures **privacy** as it only detects 6 characters of MAC address.
- Compatible to all existing BlueTOAD systems.
- Great for “hands- free” states.
- More **accurate** travel-times on lower volume roads.
- Origin/Destination Metrics more **advanced** now.
- Plug-and-Play in to existing BlueARGUS software suite.

# BlueTOAD Spectra Sample Rate



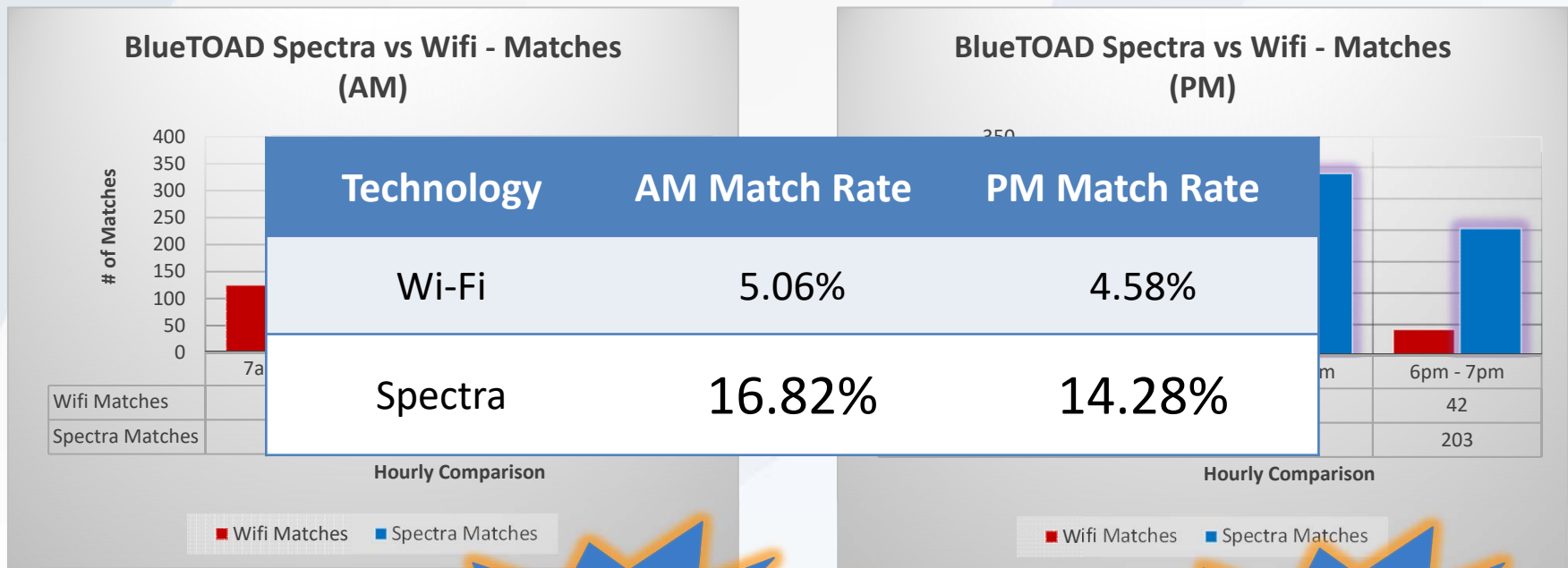
- Sample rate is the % of unique detects compared to overall volume for a given time or what % of vehicles are being detected
- ~40% or higher sample rate (far greater than Wi-Fi)





# BlueTOAD Spectra Match Rate

- 14-20% or higher match rate.
- +300% (3X) more matches than Wi-Fi matches.
- Match rate is what really matters.

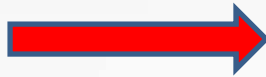


**AM = 3.3X Increase**

**PM = 3.1X Increase**



# From Device to Information



**BlueTOAD Devices**  
*Ethernet or Cellular Comm.  
to BlueARGUS Server*


**BlueARGUS Server**  
*TrafficCast OR customer hosted*

**BlueARGUS Applications**  
*Web Based Software Suite and  
XML for 3<sup>rd</sup> Party Systems*



# BlueARGUS 2.0 Software Suite



Sign Out 

DASHBOARD

SPEED MAP

BlueTOAD SETUP

REPORTS

METRICS

O/D STUDIES

ALARMS

DOCS

ACCOUNT

- TrafficCast hosted or customer hosted solution
- Web-based GUI with unlimited users
- 3 main components:
  - Simple setup of pairings and routes
  - Real-time information and alarms
  - Historical Reports and Analysis
- Over 2,000 BlueARGUS customers





BlueTOAD.<sup>®</sup>  
Spectra

 BlueARGUS

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