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Inside This Issue January 2012

95 Express Phase 2 Brings HOT Lanes to District Four	1
BlueToad™ — A Success in District Two!.....	2

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BlueToad™ — A Success in District Two!

By Peter Vega, FDOT District Two

During the month of October 2010, the Florida Department of Transportation (FDOT) District Two (Jacksonville area) Intelligent Transportation Systems (ITS) Program made a decision that will forever change our management of the region's roadway system in the coming years. The North Florida Transportation Planning Organization (NFTPO) had uncommitted funds available that they wanted to utilize on an arterial road ITS deployment. The only problem was that we had to utilize these funds within the existing fiscal year, thus leaving us with only seven months to develop and execute a project. After some mad scrambling during the week an idea arose that seemed simple enough to achieve while providing some much-needed data to the NFTPO.

In 2007, local agencies within the NFTPO region made a commitment to assist in the expansion of ITS along arterial corridors. Keeping this in mind, I recommended that the NFTPO consider the deployment of Bluetooth® technology due to the ease of installation and low cost. A meeting was set up with TrafficCast to go over the capabilities of this technology. At that time, their BlueToad product was the first and only Bluetooth device approved for use in Florida by the Traffic Engineering Research Laboratory; thus we needed detailed information prior to making a commitment. Some key elements that were addressed included software features, filtering process, accuracy, and price.

The objective with this project was to gather real-time data on roadway travel times and speeds along various corridors. This data could then be utilized by local agencies to detect and manage incidents while tracking the performance of traffic



signals along corridors in real-time. Likewise, the NFTPO could now gather information on the performance of various roadways that would be utilized with the new reports Texas Transportation Institute (TTI) had recommended to the Federal Highway Administration (FHWA). The goal stressed by TTI was to get away from giving corridors a letter grade and instead track actual system performance on an annual basis. Key elements were tracking travel times, corridor speeds, and travel time delay over a period of several years.

The initial analysis of BlueToad was sketchy since there were limited deployments or information on its performance anywhere in the country. A study provided by Atkins North America for the southwest Florida area was utilized during the decision making process. A critical selling point for our team was the origin/destination data that could be produced for use by modelers at the NFTPO. This was the turning point in our decision since the collection of this type data is usually quite expensive and time consuming. A determination was made that being able to fulfill daily needs, while generating valuable historical data, led to the commitment of \$1.1 million to purchase BlueToad devices.

Several meetings were held with the NFTPO to determine the best placement for the devices and the format of the database that would be provided by TrafficCast. We determined that the best cost saving measure was to utilize the existing traffic signal communications infrastructure to get the data back to a server. From this server, the data is sent to TrafficCast for collection, filtering, display, and archiving. So, once the decision was made, a contract was developed for the purchase of BlueToad equipment for District Two and other FDOT Districts.

We were very fortunate in meeting the deadline for fiscal year 2010/2011 or this additional funding may have been lost to FDOT's Work Program office. Orders were placed in May and delivery of the products began in June and July. The funding allowed us to purchase 140 BlueToad units for the NFTPO region and provided interlaced data for all four counties in northeast Florida. We developed a map showing the covered roads in yellow so that we could determine how much origin/destination data we could generate. When completed we realized that 85 percent of the map would have such information, thus sending the NFTPO modelers into a tizzy of excitement. I estimate that there will be over 300 miles of roadway data available to us with regard to travel times, speeds, and origin/destination information.

So, how simple is this product? In August 2011, we decided to perform a dry run with the assistance of TrafficCast staff to get a grip on what would be involved. We assembled the antenna, power unit, bracket, and cable for 20 units in about two hours. We decided to place 12 units on Interstate 95 and 8 units on US 1 with a total coverage of approximately 35 miles. The field installations to mount all the antennae to a structure, run the cables, and connect to the BlueToad data collectors placed within existing cabinets took about ten hours. Within two minutes of connecting to the ITS network we began to see data accumulating in the web site for future use. From lessons learned, we feel we can reduce the overall installation time by 40 percent through proper planning and experience.

Once we completed this installation, the next task was to determine the validity of the data. We compared the information generated from our existing vehicle detection units to the BlueToad devices. Ironically, the travel time and speed information was very accurate and has been consistently dependable over the past four months. Of course, we are only getting data from a percentage of the total volume; however, the



Speed Indicator	Type	Title	Origin	Destination	Last Match	Speed / Travel Time	
+		Bluetoad Pairings	i95 & University Blvd (u1183) to i95 & Emerson St (u1184) - North	i95 & University Blvd	i95 & Emerson St	2011-08-08 12:49:09	5.2 mph 20 min 54 sec
+		Bluetoad Pairings	i95 & Emerson St (u1184) to i95 & Atlantic Blvd (u1185) - North	i95 & Emerson St	i95 & Atlantic Blvd	2011-08-08 13:48:22	55.4 mph 52 seconds
+		Bluetoad Pairings	i95 & University Blvd (u1183) to i95 & Bowden Rd (u1182) - South	i95 & University Blvd	i95 & Bowden Rd	2011-08-08 12:49:12	68.9 mph 1 min 34 sec
+		Bluetoad Pairings	i95 & Bowden Rd (u1182) to i95 & University Blvd (u1183) - North	i95 & Bowden Rd	i95 & University Blvd	2011-08-08 13:49:19	6.9 mph 15 min 34 sec
+		Bluetoad Pairings	i95 & Emerson St (u1184) to i95 & University Blvd (u1183) - South	i95 & Emerson St	i95 & University Blvd	2011-08-08 13:49:08	64.2 mph 1 min 41 sec
+		Bluetoad Pairings	i95 & Atlantic Blvd (u1185) to i95 & Emerson St (u1184) - South	i95 & Atlantic Blvd	i95 & Emerson St	2011-08-08 13:47:23	61.3 mph 47 seconds
+		Bluetoad Pairings	i95 & Rt 1 (u1179) to i95 & i295 (u1178) - South	i95 & Rt 1	i95 & i295	2011-08-08 13:49:00	75.0 mph 48 seconds
+		Bluetoad Pairings	i95 & St Augustine Rd (u1177) to i95 & i295 (u1178) - North	i95 & North of St Augustine Rd	i95 & i295	2011-08-08 13:49:15	74.0 mph 1 min 13 sec
+		Bluetoad Pairings	i95 & i295 (u1178) to i95 & Rt 1 (u1179) - North	i95 & i295	i95 & Rt 1	2011-08-08 13:42:42	72.0 mph 50 seconds
+		Bluetoad Pairings	i95 & St Augustine Rd (u1177) to i95 & Race Track Rd (u1176) - South	i95 & North of St Augustine Rd	i95 & South of Old St Augustine Rd	2011-08-08 13:49:03	75.8 mph 1 min 54 sec
+		Bluetoad Pairings	i95 & i295 (u1178) to i95 & St Augustine Rd (u1177) - South	i95 & i295	i95 & North of St Augustine Rd	2011-08-08 13:47:58	73.0 mph 1 min 14 sec
+		Bluetoad Pairings	i95 & Race Track Rd (u1176) to i95 & St Augustine Rd (u1177) - North	i95 & South of Old St Augustine Rd	i95 & North of St Augustine Rd	2011-08-08 13:48:17	75.8 mph 1 min 54 sec
+		Bluetoad Pairings	i95 & South of St Augustine Rd (u1176) to i95 & Race Track Road (u1175) - South	i95 & South of Old St Augustine Rd	i95 & Race Track Rd	2011-08-08 13:48:50	73.3 mph 1 min 53 sec
+		Bluetoad Pairings	i95 & Race Track Rd (u1175) to i95 & South of Old St Augustine (u1176) - North	i95 & Race Track Rd	i95 & South of Old St Augustine Rd	2011-08-08 13:48:34	70.8 mph 1 min 57 sec

accuracy of these devices raised our confidence level in the data. We are averaging approximately 75 hits per 15-minute interval for each device between early morning peak traffic to about 8:00 in the evening. This is considered an excellent sample size for a 15-minute period of data collection.

The simplicity, cost, and ease of installation for the BlueToad device are the greatest selling points (besides that valuable origin/destination data). Basically, the device reads media access control addresses from various Bluetooth devices, tracking the location and time of the “hit.” Simple math and a very stringent filtering system provide the data necessary to make calculations for travel time and speeds. With the tremendous increase in smartphone purchases by consumers, I can only see the amount of data increasing with each passing year, thereby allowing us to gather more data at a lower cost as we proceed with ITS in the future.

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