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MTA Launches Bus Tracker Built on Open Standards with Help from Students and Local Startups

The New York Metropolitan Transportation Authority (MTA) last week launched a public bus tracking system that allows riders on more than 50 New York City bus routes to track real-time bus locations on the Internet, via smart phones and by text message. The system, called MTA Bus Time®, was launched using technology components from two New York City-based tech startups, research support provided by a team of graduate students, and an innovative open standards technology platform that will give the MTA flexibility in management and expansion of the service. Below are details of the innovative methods used in bringing this service to fruition.

Open Standards and Open Source Developed in New York City

While there are a number of proprietary platforms that have been created to provide public real-time vehicle tracking information, the MTA has instead opted for an "open standards" approach, which allows the agency to build and modify Bus Time using off-the-shelf hardware and software, to work with a variety of firms as the need arises, and to retain control over improvement and expansion of the system.

"Bus Time is a service that the MTA will be providing into the foreseeable future," said Charles Monheim, MTA Director of Strategic Initiatives, who is overseeing the implementation of Bus Time. "We wanted to make sure that the MTA would not be joined at the hip to one particular vendor into perpetuity, which would put us at disadvantages related to cost and control of the product. By using open standards in all aspects of Bus Time, any company that makes an off-the-shelf product can bid to provide any component of hardware or software we use in this system."

The Bus Time team decided which open standards to use, and is working with multiple hardware and software contractors to implement the system using these standards. In addition, the main software application powering MTA Bus Time is developed under an open source license, giving MTA complete flexibility to make changes itself or through other contractors in the future.

The open source approach used in Bus Time was piloted on the B63 by Open Plans, a New York City-based technology firm that works to support transparency in government by creating open source applications. Bus Time has now launched in Staten Island based on additional work by Open Plans and Cambridge Systematics, a national transportation firm with a large New York City office. Bus Time benefits from another New York-based tech firm, Mobile Commons, which set up the platform for Bus Time's text messaging capabilities.

"Innovations like Bus Time," said Mayor Michael R. Bloomberg, "are the result of the kind of entrepreneurial spirit and creativity our City thrives upon. It's the reason our tech community is growing rapidly, and why two of the firms involved in Bus Time - Open Plans and Mobile Commons - are local New York tech start-ups. Our City is home to the smartest and most talented workforce, and it's the perfect place for homegrown companies like Open Plans and Mobile Commons to expand and thrive. That's good news for commuters, our budding tech sector and all New Yorkers."

"We're really excited to be working with our hometown transit agency to make bus riders' lives a little better," said Jeff Maki, Project Lead on Bus Time from OpenPlans Transportation. "This project demonstrates that open standards and open source can be used to deliver a solution like Bus Time quickly, while creating opportunities for other businesses, both big and small, to engage with the MTA and its customers."

"The MTA and New York City lead by example with their commitment to innovation and technology," said Jed Alpert, CEO and co-founder of Mobile Commons. "As a New York City based software company, that commitment is invaluable, and as New Yorkers ourselves, it is very exciting."

Graduate Students Improve Accuracy of Data

Bus Time is based on real-time locational information provided by a GPS unit on each bus. But GPS data can be unreliable in areas where satellite reception is difficult, as in the skyscraper canyons of Manhattan, or nonexistent, as in the Brooklyn-Battery, Queens Midtown and Lincoln Tunnels used by MTA express buses. To help fill in the gaps, the MTA turned to a team of electrical engineering graduate students from City College of New York (CCNY) and Columbia University. The team, working in their own laboratories, helped MTA understand how off-the-shelf "dead reckoning" technology, which combines the bus's GPS signals with real-time information from each bus's speedometer and steering movements, can help improve the accuracy of location information. They also devised a way to supplement GPS data with location estimation algorithms that use known bus routes and geography data from Google Maps to further improve real-time location information.

"Collaboration with local universities works as a win-win situation both for the students and for the MTA," said Professor M. Umit Uyar. "Students are eager to work on real-life problems. They deliver independent verification of new concepts suggested by MTA engineers. The students and the faculty supervising them represent an unbiased point on view for various technical problems."

Open Data for App Developers

The MTA itself is making Bus Time available to bus customers via the web, mobile web, and text message. To make the data available via apps, the MTA is turning to outside app developers, who bring great expertise. To do that, Bus Time includes a free feed of machine-readable data, known as an API, for

technology developers. Under an earlier Bus Time pilot phase that provided data for the B63 bus route in Brooklyn, at least nine apps showing real-time bus locations of B63 buses were created using this data.

- B63 Bus Finder
- Bing Mobile
- Bus New York City
- Bus Tracker MTA NY / Bus Tracker Pro MTA NY
- InTime B63 / InTime NYC
- NextBus
- Roadify
- Sched NYC
- Tell Me Where the Next Bus Is

The MTA provides Bus Time data to tech developers free of charge. The MTA is expecting additional apps will be appearing soon showing real-time positions of the bus routes on Staten Island that have recently been added to Bus Time. "We want there to be a wide variety of apps using this data," Monheim said. "More outlets for the data mean that more of our customers will be able to find a way to get the data that suits their tastes and needs."

The Power of Simplicity: Text Messaging

One of the most popular outlets for Bus Time data is text messaging. While the MTA and outside firms and developers had paid great attention to developing visually appealing platforms for real-time bus data on tablets, PCs and smartphones, the agency has also been careful to broaden the reach of the information so that it would be accessible to the majority of bus customers, who may not regularly carry smartphones, laptops or tablets, but do have cell phones. Nearly all cell phones have the ability to support SMS text messaging, and 91% of Americans carry a cell phone.

"Text messaging is the most popular form of communication in the country," said Benjamin Stein, Chief Technology Officer and co-founder of Mobile Commons. "By making Bus Time accessible via text message, MTA's real time-data is available to everyone, whether they use a smart phone or a feature phone."