

MTA demonstrates successful ultra-wideband technology pilot on Flushing and Canarsie lines

The new technologies complement NYCT's \$7.1-billion investment to modernize the outdated signaling system.

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The successful results of a nine-month pilot of ultra-wideband (UWB) technology have been demonstrated by the New York City Transit (NYCT) on the Flushing 7 and Canarsie L lines, modernizing the agency's signaling system and delivering safer, faster and more reliable service.

Metropolitan Transportation Authority (MTA) officials were joined by executives from Thales and Piper Networks along the 7 line who have completed the nine-month pilot program with strong results and demonstrated the potential for UWB positioning technologies to integrate seamlessly with Communications-Based Train Control (CBTC) to improve system reliability and the speed of delivery for upgraded signaling systems.

“Signals have long been described as the backbone of the subway system, and the work to modernize them is very much at the heart of our transformation work,” said Mark Dowd, MTA's chief innovation officer. “Today is an essential first step in our broader efforts to rethink everything we do when it comes to signaling and how we can achieve greater reliability for our customers across the system.”

The pilot complements the MTA's \$7.1-billion investment into modernizing its outdated signaling system over the next several years as part of the **\$51.5 billion Capital Plan**. The initiative and partnership are the **result of the MTA's Genius Transit Challenge** first **launched in 2017**, which challenged leading companies from around the world to improve subway signals, capacity and communications for the future.

“Ultra-wideband wireless technology brings the promise of fewer and shorter delays, and faster and cheaper installation of modern CBTC signaling, by eliminating much of the equipment traditionally fitted under trains and on tracks. This is a game-changer for our customers,” said **Pete Tomlin, NYCT's head of signaling**. “We are eager to work with innovative companies as we continue to reimagine our approach to installing modern signaling across the system as part of the MTA's historic 2020-2024 Capital Plan.”

In March 2019, NYCT awarded Thales, in partnership with Piper, a contract for a UWB-based Train Control System Pilot Program on the 7 line. At the same time, NYCT awarded Siemens, in partnership with Humatics, a contract for a UWB-based Train Control System Pilot Program on the Canarsie L line. The scope of the pilot was to prepare the new platform for safety certifiability and it consisted of nine months of testing and collecting 2,500 hours of operational data. An automated data upload facility at Corona Yard has allowed for cloud-based processing of all collected sensor data from the 7 line, which could then be compared with data from the CBTC system and a LIDAR-based “ground truth” digital map.

As part of the pilot program, four trains on the 7 line, which is one of two lines in the system already equipped with CBTC, have been outfitted with the Thales' CBTC system that integrates Piper's UWB technology. Four trains on the Canarsie line were outfitted with Siemens' CBTC system that integrates Humatics UWB technology.

The demonstration, which took place on the express track of the 7 line between the 61 St-Woodside and 40 St stations, showed the potential of an even more precise positioning system, UWB, to improve system performance and recovery. The pilot proved it could also help accelerate the implementation of CBTC. Additionally, because UWB technology is installed off the tracks rather than on the tracks, it could be considerably easier for NYCT personnel to maintain in the long term and cut down on delays stemming from malfunctioning equipment on the tracks.

Key advantages of UWB pilot as the MTA works to modernize its signaling system as demonstrated include:

- Rapid implementation, achieved through a reduction of train-borne equipment by removal of undercarriage installation, which would enable the MTA to modernize aging subway infrastructure on an accelerated timeline.
- Increased train positioning accuracy, achieved through utilization of modern onboard sensors including UWB radios, which could contribute to fewer and shorter service delays for passengers.
- Accelerated start-up position initialization, enabling a train to initialize and switch to Automatic Train Operation (ATO) faster than current-generation CBTC systems.

“Thanks to this partnership with NYCT, we’re delivering cutting edge technology as we test the next generation of train positioning,” said Dominique Gaiardo, vice president and managing director for urban rail signaling business at Thales.

“Thales has integrated modern onboard sensors with a UWB network to create an enhanced next generation positioning system for our CBTC digital signaling architecture. The new system has higher accuracy, resiliency and availability and is quicker to deploy than current generation products.”

To help accelerate the modernization of the signaling system, NYCT has announced a third vendor, Mitsubishi Electrical Power Products, to qualify as a

CBTC supplier. Mitsubishi successfully completed, within budget, a development and safety certification program awarded in September 2015.

“Today we took an exciting step in safety certifying Piper’s Ultra-Wideband technology for the MTA, and we’re looking forward to rolling out this technology across other subway lines as part of the Fast Forward program,” said Robert Hanczor, CEO of Piper Networks. “Together with our partner Thales, we worked closely with the NYCT leadership team to who continually demonstrated their desire to support new technology providers and encourage innovation in the transit sector.”

Next steps

NYCT will take the lessons learned from CBTC implementation on the Flushing line and incorporate industry best practices to improve and expedite future implementation on other subway line corridors, including better costing estimates, formalized personnel structure and responsibilities, enhanced project and contractor monitoring, more frequency surveys and enhanced attention on subway car interfacing. NYCT has created a new database to capture cross-discipline feedback and information from CBTC projects to better track such valuable information to help improve future CBTC processes.

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