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## HAR Network in Nation's Capital Uses Unique GPS Synchronization

Washington, D.C. has long been home to some of the most daunting traffic in the nation, and homeland security concerns in recent years have made managing traffic in the nation's capital an even more urgent and important task.

The District of Columbia Transportation Management System recently added a new tool to help meet the challenge: a unique network of highway advisory radios manufactured and installed by Quixote Transportation Technologies, Inc. (QTT), part of their Highway Information Systems product line.

QTT provided a turnkey solution that included six highway advisory radio systems, six poles for equipment mounting, trenching and running of AC power lines, computer hardware, DR2000 software with text-to-speech capabilities,

and digital cellular telephones for remote access. The highway advisory radio stations are equipped with battery backup systems and NOAA weather receivers, providing the capability to broadcast weather information and alerts. Due to the location of one of the radio stations away from accessible AC power, QTT equipped the unit with solar panels and battery system, providing for a solar-powered system.

District Program Manager Kamal Hamud said the new system, which incorporates six HARs that cover the district's entire 68 square miles, is unique because it is the first to feature GPS-based synchronization. GPS, or Global Positioning System, is controlled by the U.S. Department of Defense and provides specially coded satellite signals that can be processed in a GPS receiver, allowing the receiver to calculate velocity, time and position. The system eliminates the need to link radio circuits with telephone landlines, allowing district staff to control the stations exclusively through the use of digital cell phones.

"We wanted to send one message to all radios, then synchronize that message," Hamud said. "We worked with [QTT] and they came up with a new GPS-based synchronization capability with their radios. If we want, we can have all six radios broadcast the same message, or use any radio to broadcast a standalone message."

He said all the radios basically provide citywide coverage, so the district uses two of the radios as primary systems and one as secondary. The others are used for specific incidents; for instance, if a particular area of the city has a traffic problem, only the closest radio might be used.

"If we want to broadcast a citywide problem we use HAR station number one, which is centrally located, Hamud said."

Unlike traditional implementations of synchronized HAR broadcasts, this system does not require the use of dedicated, always-on phone lines to deliver the audio from a master location to each of the six HARs. By using the precise timing signals from GPS, the D.C. system simultaneously launches all six HAR messages to deliver the synchronized broadcast. This approach eliminated the recurring costs of the dedicated phones lines, which resulted in significant savings to the district.

Chuck Conner, a QTT computer programmer who worked on the project, said the HAR stations needed to be precisely synchronized. "That required us to enhance our DR1500 Digital Recorder Player," he said.

In addition, the system includes the central control software, DR2000, with text-to-speech capability. Staff can type a message, and the system turns it into a .wav files that can then be sent to the radios, allowing for a consistent voice on all messages.

The system also uses a digital communications controller, which added new capabilities to the recorder. "One of the main things it does is interface to a GPS receiver that is at the station to get very accurate time signals," Conner said.

Before the attacks on the United States on September 11, 2001, the district already had started work on designing a HAR system, Hamud said, but the events of that day made it all the more urgent to get the system in place.

"We said, 'What can we do better? What do we need to do?'" he said. District traffic managers realized they needed a reliable way to get information on traffic conditions to local residents, as always in the event of construction, congestion, accidents or adverse weather, and now in the event of homeland security emergencies.

“We needed fast deployment of an emergency alert notification system,” Hamud said. “We decided a HAR system would be a way we could provide information to the public.”

“We put together a suggested list of projects that could be implemented on a fast-track basis, and the (D.C. Transportation System) director took the list and went to Congress and (The Department of) Homeland Security, and we were lucky enough to get a Homeland Security grant,” he said. “We knew that [QTT] was one of the major highway advisory radio system manufacturers. We selected [QTT] because of their experience; we wanted a company that had a proven track record. We checked their record and references, and based on their capabilities, we selected them.”

Conner said [QTT] was keenly aware of the homeland security issues the project involved and considered the district a very high-priority customer. “The ability to play a synchronized set of messages all around a city and have it all sound clear was certainly the goal of the project, and we are pleased it is working well,” he said.

Hamud said the system is being used to keep the public apprised of the current national security alert status, which has so far remained at orange or yellow.

He added that the district also already has used the system in other ways. The first time was for the national Christmas tree lighting at the White House, he said, and the system also has been used for other special events like major holiday observances, including Martin Luther King Jr. Day and the recent celebration of the Emancipation Proclamation.

"We're using it for every major special event," Hamud said. "In addition, we used it when there is a major traffic accident. We're utilizing it on a daily basis."

"The public loves it," he said. "The citizens have more peace of mind. They expect us to provide real-time traffic conditions. When there's an accident, the prudent thing to do is alert them to avoid congestion."

He added that the system also would provide the ability to alert the public in the event of emergencies like hurricanes.

"It's a really good system to have to provide information to the public," he said. "There might be a message telling people that tomorrow there will be a parade, so expect congestion in these locations. We can also let them know there will be limited parking when we close streets."

"It's a really good thing to have to let people know they have options and to warn them in advance," he said. "In Washington, D.C., we have a lot of special events. Every weekend there's a parade or demonstration."

Hamud said plans are in place to further improve the system.

"We'd like to enhance our system because we don't have any way of letting the public know to tune to the radios," he said, adding that this most likely will be accomplished through the use of 10 flashing-beacon systems from QTT, which include portable variable message signs.

"When it flashes you know to tune in," he said. The district plans to buy flashing-beacon systems that will work in conjunction with the DR2000 software so that when operators activate a message, the beacon system alerts the public

to tune in. The district also uses its own variable message signs to alert the public.

Hamud said the district was pleased to work with QTT on the project.

"They're very professional," he said. "We're proud to have a [QTT] system in place in Washington, D.C."

Quixote Corporation ([www.quixotecorp.com](http://www.quixotecorp.com)) through its wholly owned subsidiaries Quixote Transportation Safety, Inc., Quixote Transportation Technologies, Inc. and Quixote Traffic Corporation, is the world's leading manufacturer of energy-absorbing highway crash cushions, truck-mounted attenuators, intelligent intersection control systems, computerized highway/advisory radio transmitting devices, electronic wireless measuring and sensing devices, weather monitoring stations, fixed and variable electronic message signs, flexible post delineators and other highway safety products and services.

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