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Inside One of the Most Aggressive Intelligent Transportation-IoT Efforts in the U.S.

Florida's Miami-Dade County is getting ready for connected vehicles and ubiquitous intelligence.

BY BEN MILLER ([HTTP://WWW.GOVTECH.COM/AUTHORS/BEN-MILLER.HTML](http://www.govtech.com/authors/ben-miller.html)) / OCTOBER 10, 2016



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Cars really aren't that connected yet — not compared with what auto makers want to build in the next five years, anyway.

But Miami-Dade County is already preparing for them, and it's one of only a small group of local governments in the U.S. to do so. The county's Department of Transportation and Public Works, which integrates all of its transit, traffic and transportation operations, has begun installing its first set of controllers on traffic signals that will allow them to connect with cars, public transit and other vehicles in the future.

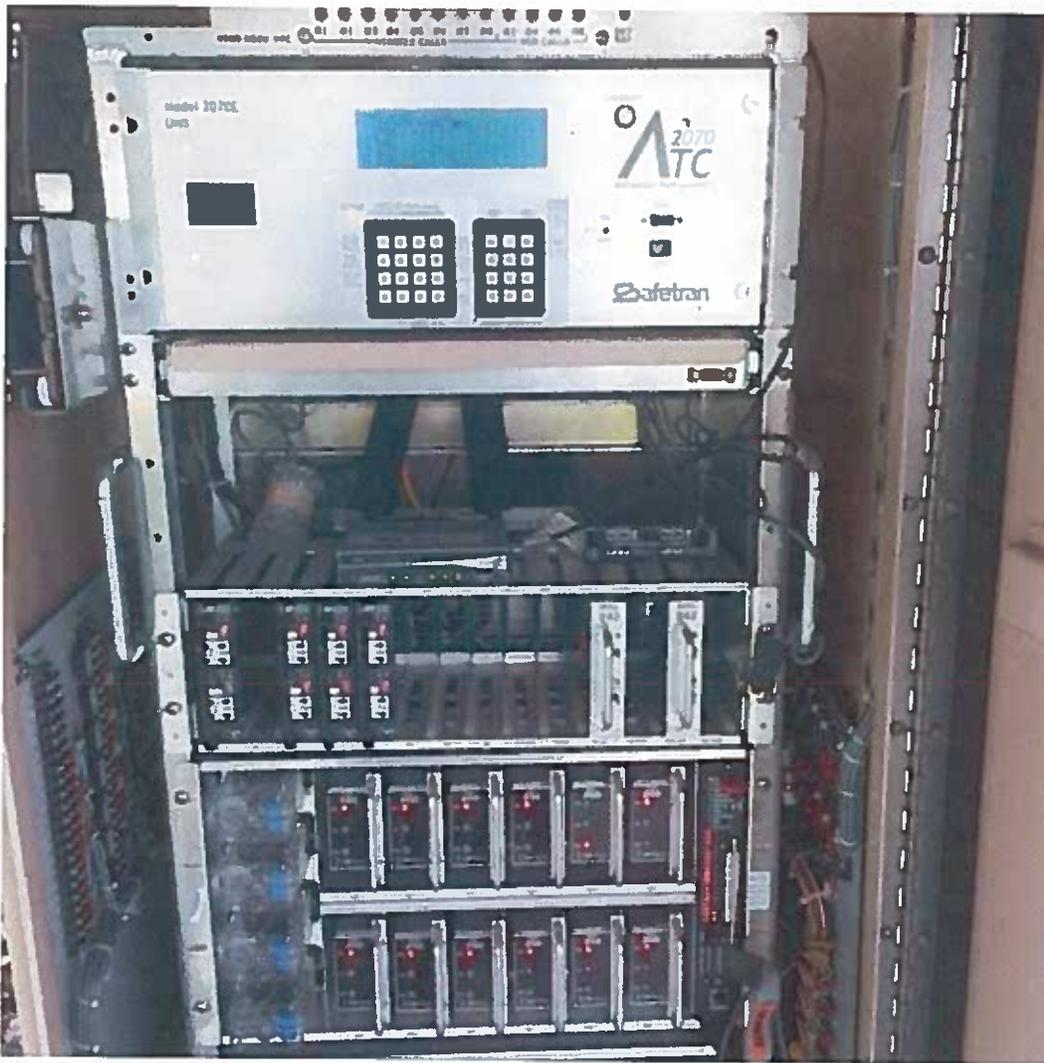
And in the process, it's also creating a backbone for the Internet of Things and other smart city projects.

“We just don't want infrastructure to be a hold-up,” said Carlos Cruz-Casas, the department's assistant director. “We know there are going to be a lot of issues to address.”

The concept Miami-Dade is pursuing is called vehicle-to-infrastructure (V2I) connection, and its promises are many. Traffic signals could coordinate cars approaching from different directions and warn about collisions. They could work with vehicles to let drivers know how fast they should be driving in order to avoid hitting a red light. And as vehicles begin to drive themselves, they might be used to help self-driving systems make decisions.

Some V2I applications are on their way to market. Audi has announced (<http://www.govtech.com/fs/Several-2017-Audis-Equipped-With-Cloud-Connected-Red-Light-Countdown-Clock.html>) an on-board application that will give drivers information about oncoming traffic signals — though that will work even in places without the kind of equipment Miami-Dade is installing — and both Mercedes-Benz and Cadillac (<http://mashable.com/2015/10/21/cadillac-2017-cts-vehicle-to-vehicle-communication/#9qotobVpNPqI>) are working on cars capable of two-way communications right now.

“Once other vehicles start doing the same ... they will all be able to talk to each other because [the auto industry] worked together on that protocol,” said Kirk Steudle, director of the Michigan Department of Transportation (MDOT).



Miami-Dade County, which has some of the worst congestion in the country according to an annual report

(<http://d2dtl5nnlpfror.cloudfront.net/tti.tamu.edu/documents/mobility-scorecard-2015.pdf#page=28>) from Texas A&M University, is home to some 3,000 traffic signals. In August, it set up the first 2070LX controller on Northwest 36th Street in Miami, the first of 300 the department will set up at key congested intersections in its first wave of installations. After that, he said, the plan is to spread out and cover the entire county. The department plans to issue a request for proposal to update the remainder of its signals by fall 2017.

“It’s important to understand that once you reach capacity, you’ve reached capacity,” he said. “So what we’re trying to do is avoid reaching capacity ... so then you can avoid bumper-to-bumper.”

Passenger cars, especially luxury models, are exhibiting more and more connectivity options and automated driving features, but the ability to connect to public infrastructure is still lacking. The Miami-Dade model, then, is about preparing for the future.

“What we decided is we’ll just go in and build the infrastructure,” Cruz-Casas said, “and we’ll start looking over the next year for companies that want to participate and join forces with us in order to develop what connected vehicles will mean for Miami-Dade County.”

The project was inspired partly by a series of projects in New York City; Wyoming; Tampa (<http://www.govtech.com/Obama-Places-160-Million-Bet-on-Smart-Cities-Internet-of-Things.html>), Fla.; and Ann Arbor (<http://www.govtech.com/transportation/An-In-Depth-Look-at-Ann-Arbor-Vehicle-to-Vehicle-Pilot.html>), Mich. Each had a different objective, but they all involved some form of vehicle connectivity — and all are aimed at testing, as opposed to Miami-Dade’s all-purpose rollout. The department is already working on writing a rule that would require new vehicles to have connectivity capabilities.

But while Miami-Dade County waits for that to happen, Cruz-Casas said they will reap other benefits from the traffic controller upgrades — the first of which is simply having more modern equipment.

“We need to change our infrastructure anyway,” he said. “Our controllers are old.”

The 2070 series of traffic controllers are, according to MDOT Intelligent Transportation Systems Program Manager Matt Smith, the most advanced available today. They aren’t quite capable of Dedicated Short Range Communications (http://www.its.dot.gov/factsheets/dsrc_factsheet.htm) (DSRC), a radio-based method of connection protected by the Federal Communications Commission, but extra equipment can make them DSRC-ready. What they can do, though, is connect to the Internet.

“You have something that is Ethernet capable, then that controller has a multitude of different paths that they can communicate through,” Smith said.

Because of that, the controllers will allow the county to implement adaptive signal timing and transit signal priority. Adaptive signal timing allows intersections to change their green-red cycles based on current traffic conditions instead of pre-set protocols. Transit signal priority allows buses and other public transit vehicles to run their routes more quickly and reliably by reducing the time they spend waiting at intersections.

Cruz-Casas said he expects the project to cost about \$217 million. The money will come from development fees and a portion of the local sales tax set aside for transportation funding.

But it won't be the only part of the county's smart governance efforts. Cruz-Casas' department — which includes public works — is also taking on a campaign to replace its 26,000 street light bulbs with LEDs. The bulbs, which use a fraction of the electricity that traditional incandescents use, will save money in the long run.

They also give the county more control over its lighting. Along with the bulb replacement, Miami-Dade will start looking at putting things like sensors and cameras on its traffic signals and street lights. Those can, in turn, provide a huge range of uses for the county to consider.

"The options for this are virtually endless, since you can tag on any kind of sensor you want," Cruz-Casas said.

Take the Array of Things project (<http://www.govtech.com/fs/Chicago-Launches-Array-of-Things.html>) in Chicago. That city, through a partnership with Argonne National Lab and the University of Chicago, is putting up sensor nodes around the city to capture information ranging from traffic and pedestrian counts to air quality and even standing water identification. It will all become open, public data available to help the city gather real-time, spatial intelligence.

Miami-Dade's plans are flexible at this point. But having the connectivity in place will give them options.

“As they [upgrade] traffic signals that are ... Ethernet connected, that becomes a backbone in the Internet of Things,” Steudle said. “It becomes a node that ultimately helps in the movement of Miami-Dade to become a ... smart county.”

Of course, the infrastructure is only the first step.

“It’s more than just putting some stuff out there in the field,” Smith said. “It’s going to be a lot of network development and application data management-type work that needs to happen in order to get the information out there broadcasting to the vehicles.”

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