by **Greg Winfree**

Connected mobility must benefit rural roads, too

We tend to think of transportation in opposing terms: freight versus passenger vehicles; rail versus road; urban versus rural. It's understandable why, since it lets us chop up the pie of improving and innovating our transportation system into digestible pieces. But it can put stakeholders in competition for limited resources. The integrated nature of tomorrow's network will necessarily require a different approach.

The growth of mega-regions—where urban boundaries meld with rural communities as cities grow closer together—is one example. The Texas Triangle, connecting Houston, Dallas/Fort Worth, and Austin/San Antonio is one such mega-region. Nighttime satellite photos of the Triangle, reveal how the rural areas between the cities are developing quickly to accommodate growth.

In the future every stop, every road, every traffic signal will be connected via constant communication. Cars will share data with other vehicles and even the traffic signal itself. Bumper-to-bumper traffic on the way to work? No worries! Your car will automatically reroute you.

The need for reliable, secure data exchange, however, won't stop at the city limits. Improving rural infrastructure must happen alongside urban upgrades. Remember, tomorrow's transportation network is more than a series of connected interstates, state highways, and county roads; it's also a single, unified transportation platform for information exchange that exists online.

When it comes to implementing advanced technology, the agricultural sector is ahead of the curve. Only now being pilot tested on our roadways, Level 3 vehicles (automated, but with human oversight/control) are already on state of the art farms.

As driving environments go, crop rows are a bit simpler than our daily commutes, whether in the city or the country. So, safely, reliably ushering in tomorrow's integrated transportation network requires significant research, testing, and policy planning. For example, at the Texas A&M Transportation Institute (TTI), we're studying how roads can alert maintenance personnel before the asphalt fails and creates a pothole. We're looking at how flood sensors can predict

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when a roadway will be washed out and how machine learning can augment human oversight in a traffic management center. Underlying that research is the idea that improving communication — reported by the infrastructure itself, evaluated through data analysis, then sent on as recommendations to first responders and the traveling public — can increase mobility, improve operational efficiencies and, most importantly, protect human life.

To get there, though, we have to reevaluate our assumptions about how the network we've built should work. The bottom line is this — an unprecedented level of data dependence and automation is coming to our transportation system. Paralleling the physical network of road, rail, and air traffic is the invisible but no less vital data exchange that will happen via the Internet of Things. And the rural connections along that network must be as resilient, reliable and sustainable as their urban analogs. Otherwise, we might find ourselves stranded on a country road missing more than just a cell phone signal.

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