



## IS IT TIME TO TALK ABOUT AUTONOMOUS INFRASTRUCTURE?

*Autonomous vehicle developers freely admit their technology currently won't work everywhere. Is smart infrastructure the answer?*

When autonomous trucks first debuted back in 2015, I assumed that the technology would rely heavily on “smart” infrastructure as a support and enabling mechanism. I wrote several columns at the time suggesting that, eventually, “autonomous vehicles” would come to be a completely integrated transportation network, with every vehicle and every structure involved playing a role in keeping traffic flowing smoothly, safely and efficiently.

I envisioned vehicles augmenting their onboard suite of sensors, GPS tracking systems and cameras with constant information coming in from other vehicles as well as critical infrastructure such as “smart” traffic lights and interactive lane markers, guiderails and structures like overpasses flashing invisible electronic signals outward — like a lighthouse in the days of sailing ships — to help guide vehicles down the road: “I am a bridge embankment — do not crash into me.”

At the time, I compared such a traffic network to those old choreographed swimming movies from the 1940s, where everyone moves in perfect harmony and coordination with everyone else in the scene. A college marching band, performing some sort of visual graphic on the field is another good analogy.

Well, I was wrong about that.

Without exception, every autonomous vehicle developer and OEM opted for a “go it alone” approach. The systems they are designing today are completely self-sufficient and operate on their own. Apart from GPS telemetry, these vehicles don't take in any outside information to help them navigate in traffic.

They don't know the intentions of other cars. They “recognize” objects in the road. And they are programmed not to run into them. But it's all a one-

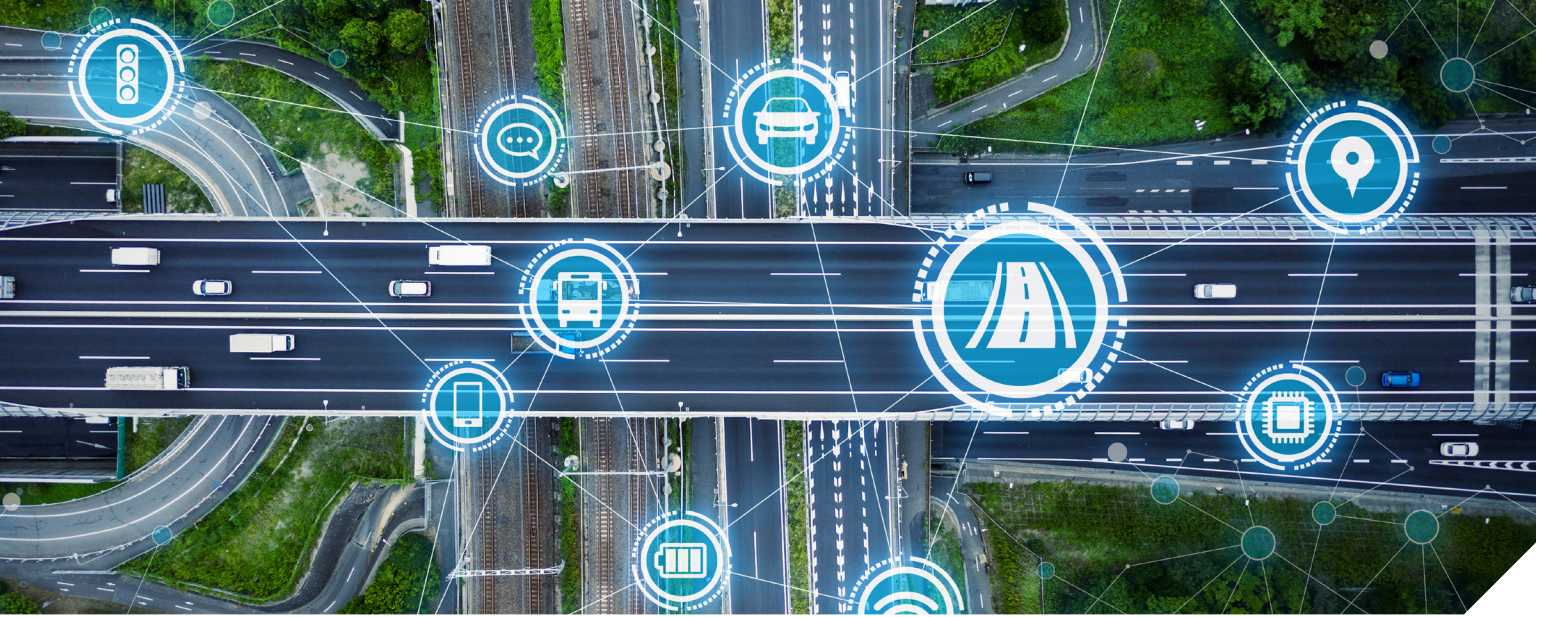
way, self-contained package. Traffic lights, for example, aren't flashing them information on how much longer they're going to stay green this cycle, for example. Multiple traffic lights, and other vehicles on the road, aren't feeding them information on traffic speeds and the number of vehicles on the road.

The vehicles must largely fend for themselves when they're in autonomous mode. Currently, the only real outside support they get is the human driver who still has to be sitting behind the steering wheel keeping an eye on things and standing by to help out, if necessary.

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And you can't blame the autonomous developers for taking this route. There is almost no “smart” infrastructure anywhere in North America today. In fact, our infrastructure as a whole isn't even up to 1950s standards, anymore. And if the autonomous tech developers stood by waiting for smart infrastructure to be built, we probably wouldn't see autonomous trucks for another 100 years.

And — I have to be clear here — the various autonomous trucks in which I've over the past several years work amazingly well dealing with roadways jammed



with unpredictable human drivers. The systems are extremely impressive. And I remain convinced they will soon begin to play a role in helping fleets move goods in North America.

However, autonomous developers have been frank in admitting that their current slate of sensors and cameras are easily confounded by all too common operating conditions in trucking such as snow, ice, mud, dust and fog. Any of these things can quickly blind some, or all, of the sensors and cameras on an autonomous truck, rendering it inoperable until conditions improve — or someone comes along with a wet rag to clean off some camera lenses.

Which is why you repeatedly hear autonomous developers say that the eventual deployment of self-driving trucks will have a regional rollout. They'll likely appear first in the U.S. Southwest, where hot, dry, predictable weather will keep sensor and camera performance issues manageable.

But maybe it's time to reexamine the role smart infrastructure can play in helping autonomous vehicles perform safely and reliably in other parts of the country where the climate is harder for those sensors to deal with.

“Smart” lane markers and guiderails would be a tremendous safety asset for a self-driving truck in a snowstorm, for instance. So would crowd-sourced

telemetry from other vehicles on the road. In fact, I'd argue that giving a self-driving vehicle as much information as possible about its surroundings — both dynamic and static — is the best possible long-term strategy for ensuring safe and productive autonomous vehicle deployment operations in the future.

This is a tall order. A year ago, at the Advanced Clean Transportation Expo (ACT Expo) in Long Beach, CA, several speakers noted the urgent need for all-new infrastructure for multiple fuels and power sources to support battery electric, and zero-emissions vehicles in the future. Each of these new infrastructures will cost billions of dollars to develop.

And, I'd argue that we need to add all-new, modern, smart infrastructure to that already-lengthy list of infrastructure upgrades we need to make today, to support efficient trucking and transportation in the next century.

**About the Author:** Jack Roberts is a transportation journalist who has been covering North American commercial vehicles for 25 years and has developed a reputation as a leading authority/futurist concentrating on new trucking technology, including autonomous vehicles, battery-electric trucks and emerging blockchain technology.



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