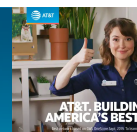




AT&T. BUILDING 5G ON AMERICA'S BEST NETWORK



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5G could make self-driving cars smarter and commutes safer

A 2-year-old technology called C-V2X could arrive in 5G-equipped cars in 2022, displacing a 20-year-old alternative that hasn't caught on.



Stephen Shankland Aug. 27, 2019 9:02 a.m. PT

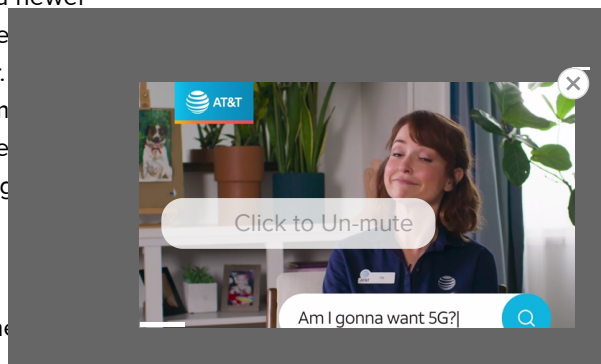


A prototype Ford autonomous vehicle cruises around Miami. Ford plans to bring the C-V2X technology to its cars in 2022.

Ford

Self-driving cars can already see and think for themselves. But a newer technology that will run on soon-to-launch 5G networks promise them another advanced skill: the ability to talk with one another. A communications technology using the same 5G networks coming to our phones, will allow vehicles to communicate wirelessly with each other, with traffic signals and with other roadside gear, improving functionality and safety.

Cars won't just broadcast their location, speed and direction -- something some already do today with today's 4G networks. The



lights. Vehicles could also talk with each other to [create a platoon](#) to squeeze more cars on the road and improve fuel economy.

The technology initially should help conventionally driven cars -- for example, warning you about collision risks or icy roads. But it'll really shine by making autonomous vehicles more capable and thus more practical, advocates say. Smarter self-driving cars will be able to decide what to do on their own instead of handing control back to a human or slowing down to try to avoid a problem.

"C-V2X will unlock the full potential of self-driving technology by adding an additional sense," said Maxime Flament, chief technology officer of the [5G Automotive Association](#).

C-V2X is set to overtake a two-decade-old effort called Dedicated Short-Range Communications (DSRC) that achieved only scattered success. V2X refers to vehicles communicating with everything -- more than just vehicle to vehicle (V2V), vehicle to infrastructure (V2I) or vehicle to pedestrian (V2P). The C means the communication happens on the same cellular network technology our phones use.



Watch this: How cars may let 5G shine the most ▶ 6:21

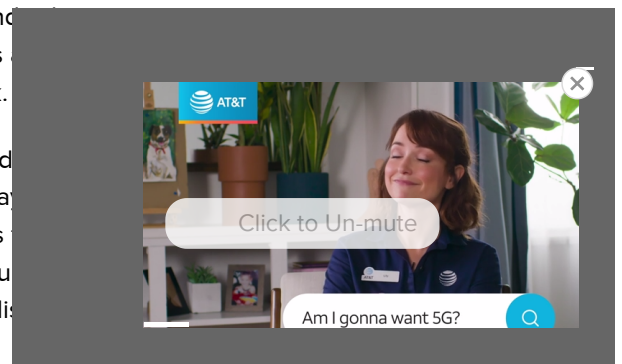
Growing C-V2X alliance

The 5GAA, a consortium backing C-V2X, had eight founding members when it began in 2017. Now it has [120 members](#), Flament said, including major players that span several industries.

Carmakers including Audi, BMW, Daimler, [Ford Motor](#), GM, [Honda](#), [Hyundai](#), [Nissan](#), Volkswagen and Volvo are members. So are tech companies, such as Intel, [Samsung](#) and [Qualcomm](#); auto electronics companies like Alpine, Continental and Bosch; network equipment makers including [Nokia](#) and Ericsson; and carriers [AT&T](#), [T-Mobile](#), [Verizon](#) and Vodafone.

C-V2X already works on today's 4G networks. [3GPP](#), an industry group that develops wireless network standards, has incorporated some C-V2X technology allowing cars to broadcast basic driving information over 4G networks. 3GPP's Release 15, an update to the 5G standard expected later this year, will support the downloading of videos and maps for cars, said Uwe Puetzschler, head of Nokia's V2X work.

But [Release 16, expected by mid-2020](#), will enable the more radical V2X abilities, such as letting multiple cars negotiate the best way to traverse an intersection, Puetzschler said. That will require 5G's fast response, known as [low latency](#) in the industry. Release 16 should reduce latency from tens of milliseconds down as low as 10 milliseconds.



One car sees with another car's eyes

5G can also transfer more data than 4G, letting cars share sensor data like input from video cameras and radar. "If you want to overtake a big truck, you would appreciate some sensor data from in front of the truck," Puetzschler said.

The popularity of 5G could help automakers swallow the estimated \$200 to \$300 it will cost to add network hardware to a car, said [IHS Markit analyst Christian Kim](#). Cars with built-in 5G get streaming video in the car, firmware updates and traffic accident information. C-V2X then comes along for the ride -- an advantage not true for DSRC.

Some drivers might balk at the prospect of adding another monthly wireless network payment to their budget, so carmakers might offer several years' free service to spur adoption. But C-V2X doesn't need a connection to a network run by a carrier like Verizon or AT&T. C-V2X cars can communicate directly.

That direct communication link also is faster than one that has to take a detour through a carrier network. And it helps cope with the fact that 5G network coverage can be spotty and slow to arrive, even with mandates in countries like Germany to blanket every freeway.

Of course, C-V2X still has to win over some important constituencies. Self-driving car companies, like Waymo, from Google parent company Alphabet; General Motors-controlled Cruise; and electric vehicle maker [Tesla](#) are still skeptical and are conspicuously absent from 5GAA's roster.

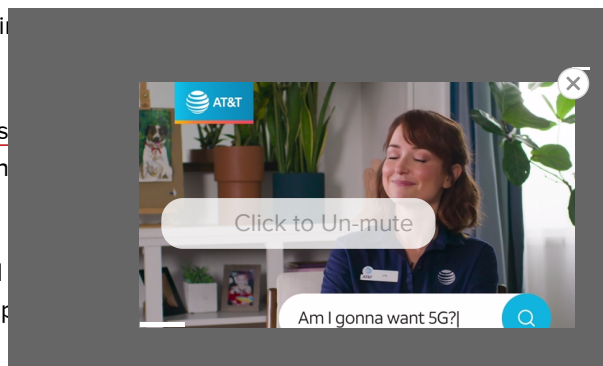
Tesla didn't respond to a request for comment. Waymo said that its cars are designed to drive on "roads as they are today" and that self-driving cars don't need 5G, but offered no further comment. And Cruise had a similar stance: "Our all-electric self-driving cars are built to drive safely on today's roads with today's infrastructure," said representative Milin Mehta.

Getting government on board

C-V2X advocates also must convince regulators, a process that takes time. In 1999, the US government carved off a valuable slice of the airwaves near the 5.9GHz frequency band for DSRC, the earlier standard. Backers of C-V2X now want about a quarter of that wireless spectrum.

The [Federal Communications Commission](#) is reviewing opinions on a waiver that could make room for C-V2X. Among those supporting the standard: [GM](#), an early DSRC supporter.

In July, [European regulators](#) signaled they were also interested in seeing how C-V2X develops. Some Chinese cities are active supporters and indeed [China could be where C-V2X first arrives](#).



The regulatory situation has hampered DSRC. [Toyota](#), which remains a DSRC fan, "paused" its plan to build the earlier technology into cars starting in 2021 because it needs a commitment that the 5.9GHz spectrum will be preserved, said Nathan Kokes, a company spokesman. Chipmaker NXP is promoting DSRC and its European equivalent, pWLAN, saying it's more mature than C-V2X. Neither Toyota nor NXP are 5GAA members.

Still, C-V2X is a powerful if less mature force. 5G will spread across billions of phones and thousands of mobile network access points, and the auto industry can piggyback off that breadth and power.

IHS Markit's Kim said the DSRC battle is lost. More companies are investing in C-V2X and the telecommunications industry has formidable lobbying clout.

Last year, it wasn't clear whether C-V2X would prevail over DSRC, Kim said. "Now, it's very clear."

Ford is a fan

Ford is among the companies that have already come to that conclusion. In 2022, [Ford vehicles will get C-V2X](#), making the carmaker one of the standard's most bullish advocates. After heavy DSRC investment, Ford concluded C-V2X is faster, more reliable and less expensive, according to Jovan Zagajac, manager of Ford's Connected Vehicle Platform and Product team.

C-V2X even could eventually let cities eliminate traditional traffic signals, he added – though accommodating the millions of cars without C-V2X makes that a distant possibility, even if regulators start requiring C-V2X on new cars.

Zagajac says C-V2X will supplement a car's sensors with more data about traffic signals, road construction and emergency vehicles, which can send a self-driving car an unambiguous signal to pull over when a fire truck or ambulance wants to pass. "C-V2X will help unlock the full potential of self-driving technology," he said.

Originally published Aug. 27, 5 a.m. PT.

Update, 9:03 a.m. PT: Adds comment from Cruise.

Correction, 8:28 a.m. PT: This story initially misstated the name of the person providing the information about Ford and C-V2X. It is Jovan Zagajac.

Ford's autonomous cars on the streets of Miami

