

ALEX DAVIES    TRANSPORTATION    JAN 5, 2017 7:00 PM

## **Nissan's Path to Self-Driving Cars? Humans in Call Centers**

Remote operators could be the simple, scaleable answer to what Nissan says is an unsolvable problem: making robot drivers do everything humans can.



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"**THIS IS IT!**" Maarten Sierhuis says. "I mean, look at this." He points to a photo of road construction at an intersection in Sunnyvale, California, near Nissan's Silicon Valley research center, which Sierhuis runs. A line of cones shunts traffic to the left side of the double yellow line. The light is red. A worker holds a "Slow" sign. It's the sort of seemingly unremarkable situation that can trigger convulsions in the brain of an autonomous vehicle.

"There is so much cognition that you need here," Sierhuis says. The driver---or the car---has to interpret the placement of the cones and the behavior of the human worker to understand that in this case, it's OK to drive through a red light on the wrong side of the road. "This is not gonna happen in the next five to ten years."

It's a stunning admission, in its way: Nissan's R&D chief believes the truly driverless car---something many carmakers and tech giants have promised to deliver within five years or fewer---is an unreachable short-term goal. Reality: one; robots: zero. Even a system that could handle 99 percent of driving situations will cause trouble for the company trying to promote, and make money off, the technology. "We will always need the human in the loop," Sierhuis says.

But Nissan has a solution: a call center with human meatbags ready to take command via remote control.

## Call for Help

Now, if you've ever telephoned a cable provider, airline, or insurance company for customer service, the idea of a driverless car that relies on headset-wearing cubicle-dwellers hardly seems *cutting edge*. But Sierhaus says his team's idea, called

"Seamless Autonomous Mobility," is a simple, scaleable answer to the fiendish problem of making robot drivers do everything humans can.

Other players in the autonomous field aren't about to announce their tech can't match the vagaries of the real world, but they have looked into remote human backups---"teleoperation," in the parlance of the business. "It's going to be massively important," says Karl Iagnemma, co-founder and CEO of self-driving startup nuTonomy, which is developing a remote control system. Even cars that can handle just about anything will have the occasional failure, even if that's being hit by another vehicle. And in that case, you want a human around to decide what to do. It's like an elevator, Iagnemma says: You don't need a human operator, but you've still got a button to call for help when you need it.

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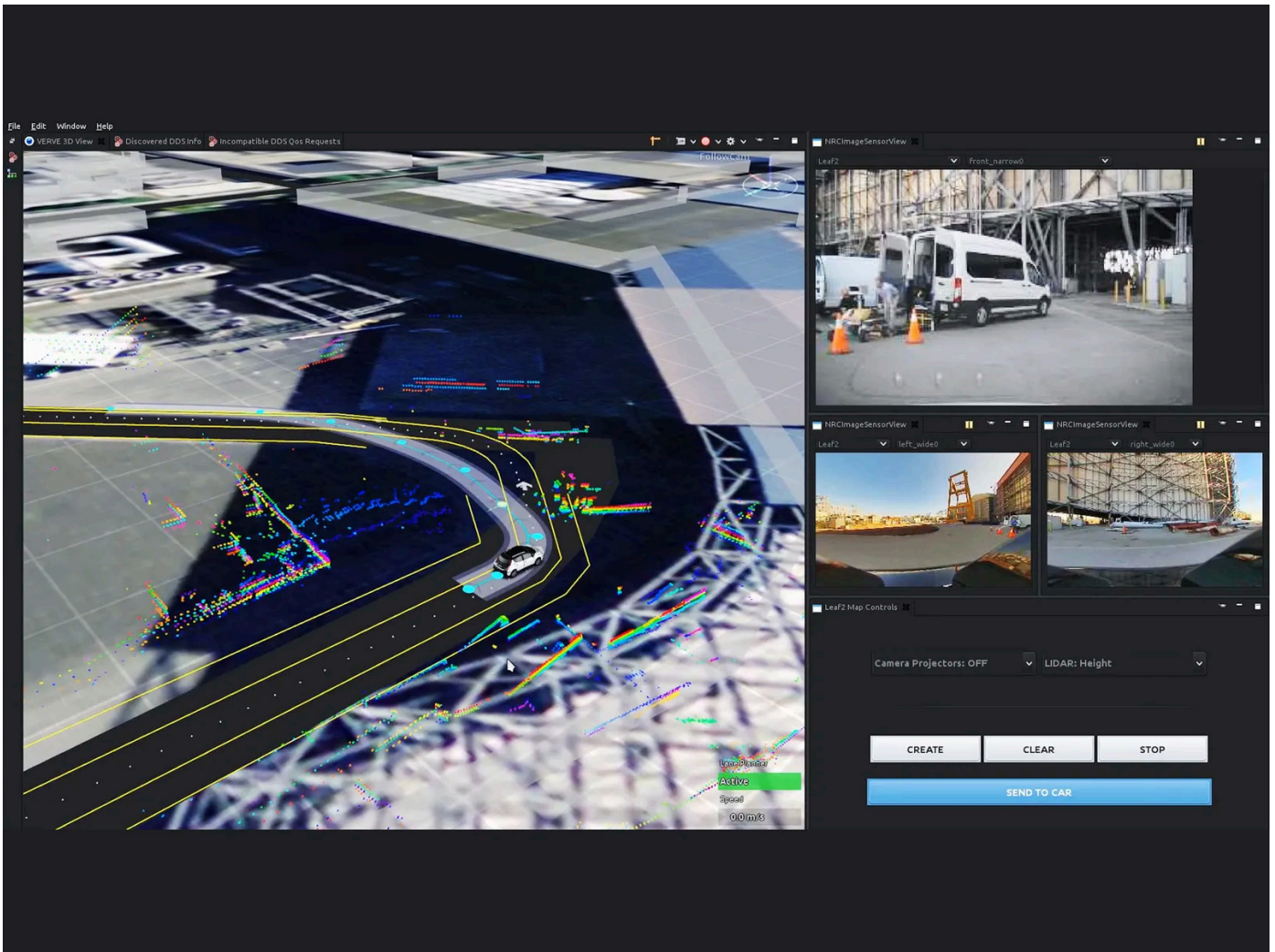


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Google's self-driving car outfit, Waymo, has studied the idea, a spokesperson says. Uber declined to comment on teleoperation, but in 2015 the company filed a patent for a system that would let an autonomous vehicle follow a human-driven car, or get help from a remote operator. Stealthy self-driving car startup Zoox has a patent for a "teleoperation system and method for trajectory modification of autonomous

vehicles;" Toyota has one for "remote operation of autonomous vehicle in unexpected environment."

Now, Nissan's cubicle-based drivers aren't emergency backups. If the car hits black ice, it's in charge of staying on the road. There's no feasible way to get the human into the loop in time to act. But they can help out when the car encounters conditions it's unsure how to handle. If a Nissan happened upon the construction scene from Sierhuis' photo, it would stop and ping its control center. A human operator would look around using the car's cameras and other sensors and issue new instructions---direct control would pose latency issues. Like: When it's safe, cross the double yellow and get back to the right side after 20 yards. Or a new instruction set could ensure packages and disabled passengers get dropped off in exactly the right spot, and help assess potentially dangerous situations on the road. But most of all, the teleoperator is there to make sure the car's doesn't just shut down when it's too dumb to know what's going on.



Nissan's system is a modified version of the software that helped engineers move the Spirit and Opportunity rovers around Mars.  
NISSAN

## Fast Forward

Nissan has been working on autonomy for years, mostly focused on giving conventional cars new abilities. But CEO Carlos Ghosn sees the value of a vehicle that doesn't require an onboard human---especially for building fleets for ridesharing services and logistics companies (that's cargo). Boston Consulting Group pegs this market's value at \$42 billion a year by 2025. Knowing there's a person, somewhere, ready to help if the technology falters, could accelerate the shift toward a mostly a human-light future.

"We said wait a minute, there is a market which is developing, there is a lot of commercial interest. We cannot ignore it," Ghosn says. Amazon, FedEx, Alibaba, and others are going to want driverless cars---and Nissan will want them as customers.

"It's part of our job to say, there's a need here, and we need to fulfill the need because we have the technology."

To make it happen, Nissan's capitalizing on a partnership with NASA, using a modified version of the software that helped engineers move the Spirit and Opportunity rovers around Mars. NASA is one of the few organizations on the planet with serious teleoperation experience, and top members of Nissan's self-driving efforts, including Sierhuis, are space agency alums.

Since getting going on this idea two and a half years ago, Nissan has studied bus dispatch systems and air traffic control centers. It's testing with a fleet of self-driving Leafs at NASA's Ames campus in Sunnyvale, and has an anthropologist on staff to think about how human riders will interact with the system. The team has researched how quickly a call center would have to respond to help signals. Based on an early simulation, it's about 30 seconds, but that doesn't take into account how drivers of other cars feel. Because if you're ambivalent about Nissan now, just wait until you're stuck behind one of its cars that basically just gives up because it doesn't understand what a traffic cone is.

That kind of communication is critical, says Wendy Ju, who studies human-machine interaction at Stanford, with a focus on autonomous cars. Knowing there's a human on-call can encourage trust from riders, as long as Nissan develops an interface that makes them comfortable. "Little things like eye contact or tone of voice are the basis of trust," Ju says. It's the same with a human-machine interface. "It happens at a psychological level."

Then the automaker has to figure out how many roving robots any human employee can handle. Too many, and the system's not as efficient as it could be. Too few, and you risk leaving cars stranded all over the roads---not a good look. But that one doesn't seem to worry the team. "The system by its very nature is designed to scale up," lead researcher Liam Pedersen says. "There is no fundamental limit, it is simply a question of cost." And once the money's rolling in, that's an easy problem to worry about.



[Alex Davies](#) is a senior editor at Insider and the former editor of WIRED's transportation section, where he specialized in covering autonomous and electric vehicles. He is also the author of [Driven](#), a book chronicling the origin of and race to create the self-driving car. ... [Read More](#)

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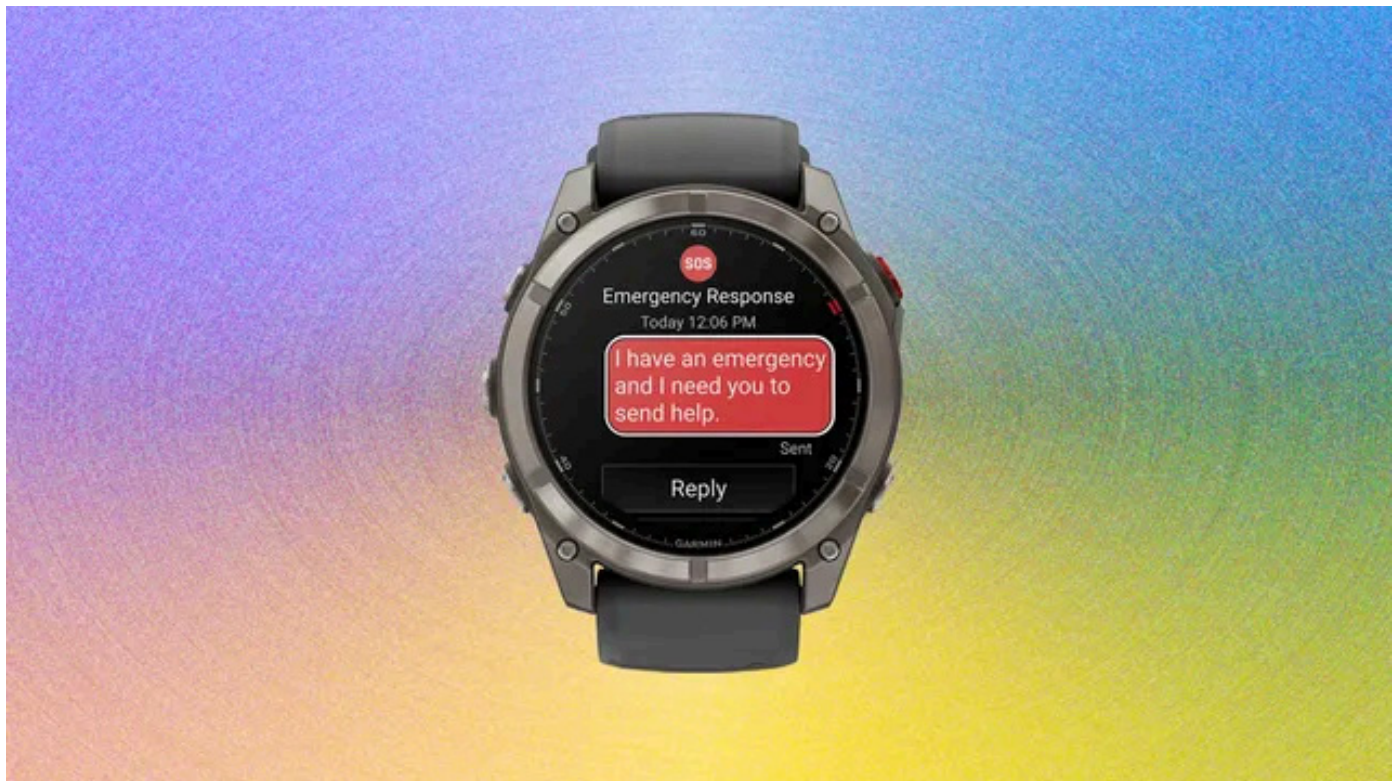


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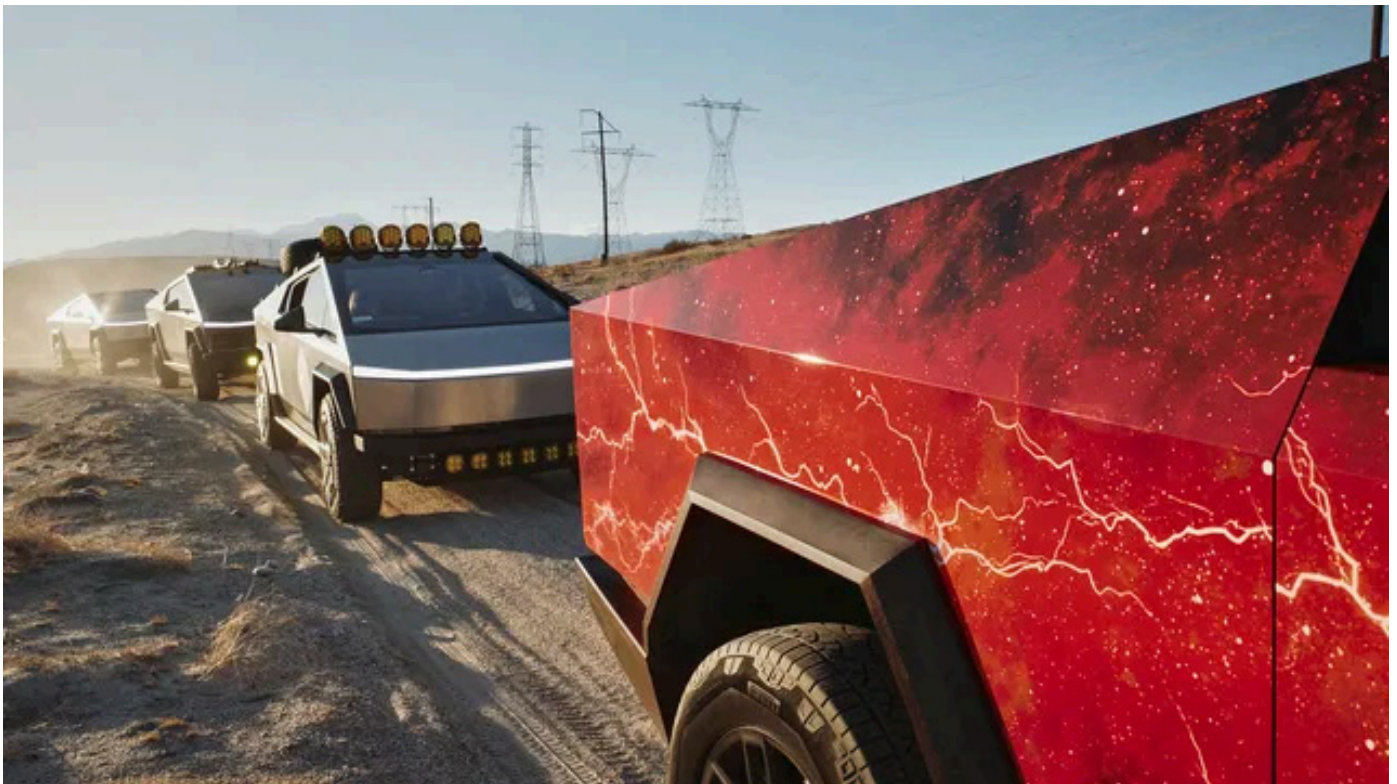
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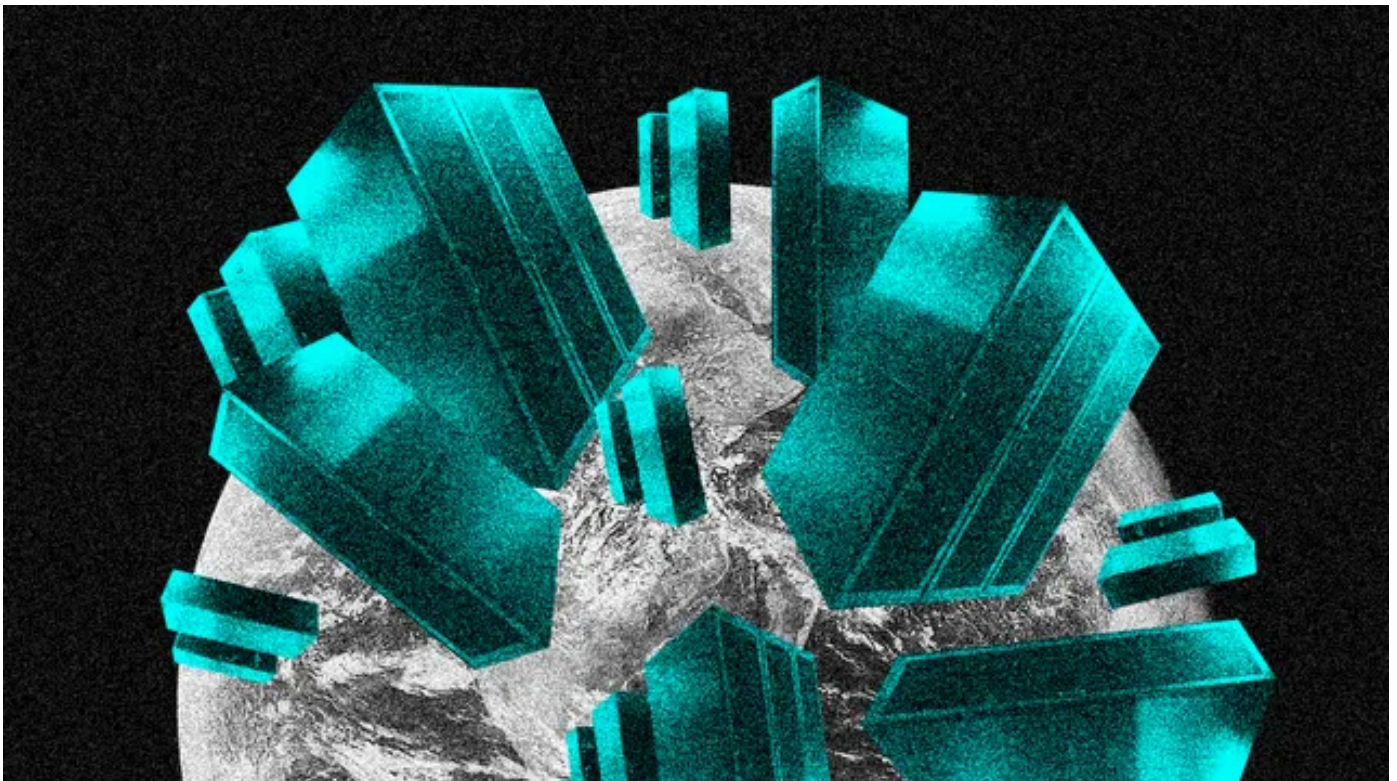
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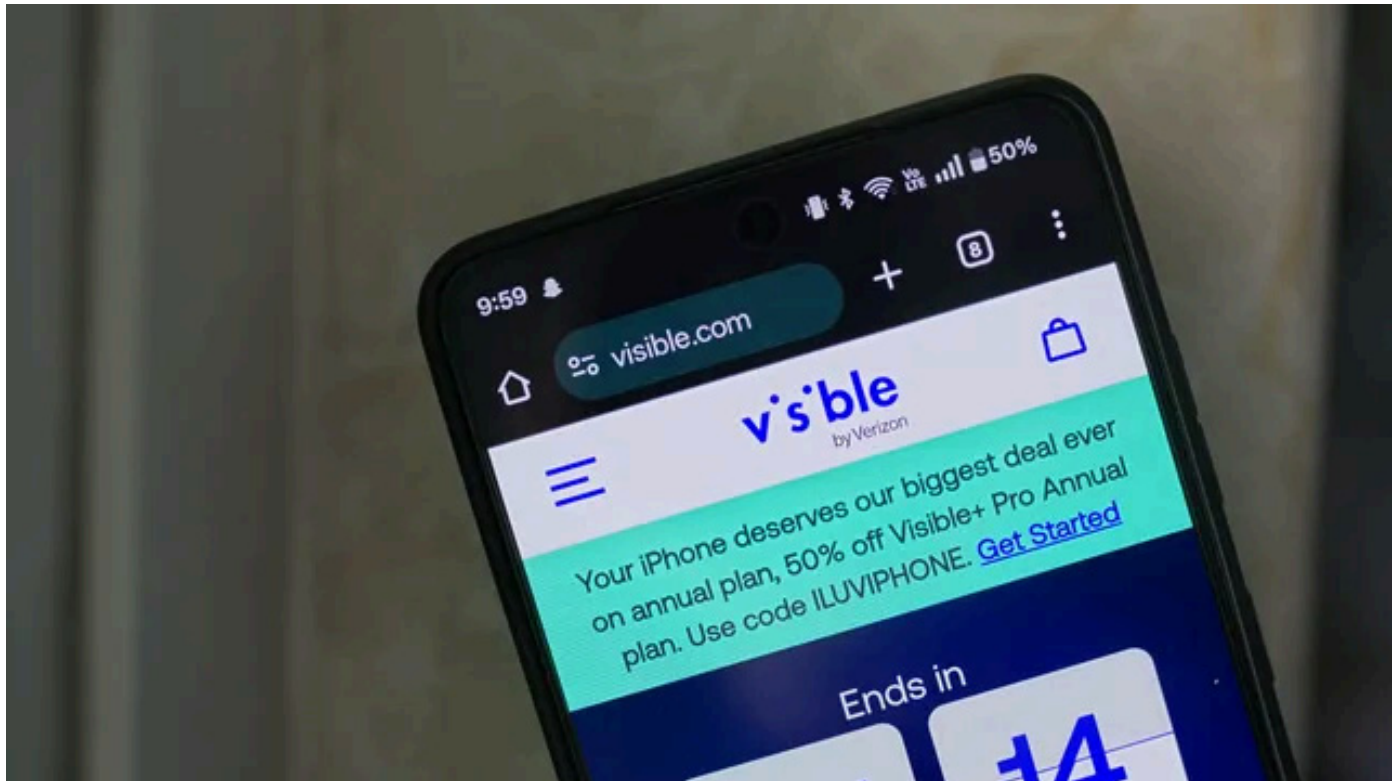
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