

## **What's the most innovative aspect of vehicle-to-vehicle communications?**

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**Andreas Mai, Director of Product Management, Cisco Systems, Inc.**

V2V communication and onboard sensing technologies can protect drivers and their families from crashes, while helping prevent (or avoid) traffic jams and serving as an enabler for automated driving. Industry experts expect that, by 2020, 50 to 70 percent of new vehicles produced around the world will be equipped with embedded connectivity solutions. Additionally, it's predicted that customers will retrofit their vehicles with connectivity, driven by either the automotive industry or government. The debate on if automated vehicles will leapfrog connected vehicles is misguided. A safe, automated vehicle will benefit greatly from a fusion of inputs from onboard sensing devices, offboard data feeds from other vehicles, the infrastructure, and cloud-based services.

While the vehicle will need to continue operating for a short timeframe (in the unlikely event that connectivity to the outside world is interrupted), real-time warnings on imminent surrounding dangers outside the reach of onboard sensors or line-of-sight — together with real-time information on traffic flow, adaptive speed limits, signal timing, and free parking — will be critical for the delivery of a safe and enjoyable automated drive on our streets. At the same time, drivers can enjoy the freedom of passengers and take advantage of Internet on the road, thus making the drive or commute more enjoyable and productive. This is why the technology, which delivers ubiquitous and secure Internet connectivity on the road, will become an important standard feature of the future vehicle.



**Davide Santo, Freescale Semiconductor's safety and chassis segment manager**

I believe before we can use a V2V or even a V2X technology, there must be more sensor fusion around the car. In other words, the car first needs to map what is around it for at least a space up to 160 to 200 meters in front of it. Examples of the technology needed are vision cameras with more sophisticated image-signaling processing, radar units capable of faster modulation of frequency based on 76 to 81 GHz main carrier, and infrared technology, night vision, and laser sensors that give a vehicle situational awareness.

Dedicated Short Range Communication (DSRC) is another area of innovation for V2V communication. As vehicles become more connected to a wide range of networks, DSRC is creating tremendous opportunities in vehicle safety. Advancements in DSRC are opening a new category of 'predictive' safety. This technology allows vehicles to convey spatial awareness and driving status to other connected vehicles on the road. When a car is connected to a DSRC network, it can alert surrounding cars if it has been in an accident, which would then travel back as a wave of dashboard alerts through the approaching traffic. It's an essential component of V2V communication that will help facilitate the information exchange necessary for autonomous mobility.

It is very likely that V2V technology will soon become standard on vehicles as the standards in safety advance. The U.S. Department of Transportation has recently conducted a number of test cases/trials, which could move the U.S. towards potential regulation of implementing DSRC in all new vehicles beginning in 2018. However, there are a few technologies that may take precedence in the near-term because cars need to first collect data in order to be able to convey it to surrounding cars and most importantly, secure the data.

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Published on Electronic Component News (<http://www.ecnmag.com>)

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**Herbert Hanselmann, ECN reader**

I have the latest ACC with radar in my car, camera, lane departure warning, and what have you. Still, I need to watch out all the time, analyze the situation, engage, disengage, set a new setpoint, and so on. If I don't do that, it can still become dangerous or at least uncomfortable, because the still relatively dumb system does not understand all it "sees". It may hit the brakes when there is, in fact, no danger. It could do better with Car2X. Also, I generally hate braking (one reason being fuel consumption) and would therefore welcome Car2X-based traffic management systems that tell my car what speed gets me through a green light and avoids accelerating just before it becomes red. Same for speed limits that come unexpectedly.

If I am on a German Autobahn at 180 km/h and then 120, 100, and 80 limits come on in short sequence, I need to brake rather hard or risk a fine. As I said, I hate braking, so more timely warning is needed, be it from infrastructure or other cars ahead. My company provides tools for developing and testing such systems, and we see a lot of development going on. Once drivers used such systems, they want it in their next car, too. I also have speed limit traffic sign recognition. Also a Lim button, with which I can take the actual speed and use it as a limit (with override option) so that stepping on the gas, if not too hard, will not lead to acceleration beyond the limit. All those features, however, only inform the driver; they do not take control. As these features are onboard features not requiring Car2X, I left them out.

**Source URL (retrieved on 12/26/2014 - 8:54am):**

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