VDI NACHRICHTEN

Data exchange makes driving much safer

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AUTOMOBILE ELECTRONICS: *The idea of networked cars has been around for a long time. With a large fleet trial the automobile industry has been able to prove that Car-To-X technology is ready for production cars.*

Outfitted with a multitude of sensors, control devices, and sensors, modern utility vehicles have been "intelligent" for a long time. What is still missing to approach real human intelligence is the capability to communicate with each other—for example, to be able to mutually warn each other of impending danger. Although the chicken-and-egg problem exists with the introduction of this kind of networked system, it is rational, however, to outfit the street traffic infrastructure with intelligence.

The fundamental technology for the "Car-to-X" communication has been developed and tested since 2008 by the German industry under the collaborative research project "simTD". "Our goal was to increase the sensor range through communication and thus broaden also the telematics horizon of individual vehicles," explained project leader Christian Weiß of Daimler.

Even at the beginning of the project the partners had agreed that the WLAN and cellular communication channels should be employed, in order to exploit the best possible coverage. All vehicles were therefore outfitted with a gateway, so that the WLAN standard ITS G5 as well as the cellular data exchange over IP were employed.

Intelligent networking: the Car-to-X technology from Mercedes Benz. (source: Daimler)

The data processing and above all the tie with the GPS data of the vehicle were accomplished with separate electronics, which were connected with the gateway through Ethernet. This box works with the Java technology OSGI and makes it possible that its functions can later be embedded in the existing infotainment system.

Experts conclude from this that even other components of the system—for example the cellular part of the gateway—will be built into future vehicles. In mid-June the European Union agreed on guidelines that from 2015 every new vehicle must be outfitted with an automatic emergency-call system.

Gateways and control devices with almost identical technology should also be built into the street infrastructure—for instance into traffic displays or street light systems. There they serve not simply as relays for vehicle signals, which are passed on in part by fiber optic cables to traffic control centers. Even more they serve direct traffic control. For example, they can be used to allow all the lights in the direction travelled by emergency vehicles to be set to green. Also a traffic-flow-related stop-light switching is imaginable. The signal exchange occurs over a standard interface modeled on OTS2 (Open Traffic System).

The central concern of the fleet testing with more than 120 vehicles was to test the robustness of the technology under conditions as close to reality as possible. "The good news is, Car-to-X stood the test in everyday use," was the result from project leader Weiß.

For example, warning of a traffic jam ahead was successful in 97% of all cases. Safety-critical functions were investigated under laboratory conditions on a test track. One test carried out there involved an unknown intersection with two vehicles approaching each other at 50 km/h (30 mph). With a probability of 99% each vehicle received a warning 7 seconds prior to a collision. At that point in time the distance to a predicted crash was 97 meters, while the stopping distance was only 30 meters.

A connection between the driver warning and an automatic braking system was not a part of the project. A decision about such an automatic intervention must be made on legal grounds on the basis of the vehicle sensors. It would, however, be technically possible to pre-activate some of the safety system, such as the seat belt tensioner.

A driver would profit not just from warnings of danger by a nationwide outfitting of simTD technology. The data from all equipped vehicles would flow into a traffic flow control center, where it could be assembled into a general picture of the traffic situation. With traffic jams possible detours could be worked out, tested for their plausibility, and then sent back to the vehicles.

- With total funding of 69 million euros, simTD is one of the largest collaborative research projects that the automobile industry has ever carried out in Germany and in Europe. The funding, through the Federal Ministry for Traffic, Economy, and Research amounted to 40 million euros.
- Audi, BMW, Daimler, Ford, Opel, and Volkswagen, as well as suppliers Bosch and Continental and also Deutsche Telekom all took part in simTD. Six research areas supplied scientific competence. Further Hessen Mobil and the city of Frankfurt were involved.
- In the framework of the fleet testing 122 vehicles were involved and more than 100 infrastructure facilities. Test drivers drove more than 1.7 million km on public streets and roadways. Additionally test driving was done on closed test facilities.