Traffic technology for a cooperative commute?

June 10 2010

(PhysOrg.com) -- Could chatty cars spearhead a peaceful revolution and traffic communications act as force to unite commuters instead of a curse to enrage them? Thanks to new 'intelligent traffic' technology developed by European researchers, we could be in for a more cooperative commute.

It’s good to talk, and new ‘intelligent traffic’ technology developed by European researchers should make traffic a whole lot chattier.

It is all part of the much larger vision to create cooperative vehicle infrastructure systems that communicate with all the elements making up the road system: vehicles communicating with each other and with road signs and central services, and drivers who don’t know each other talking about their route.

Moreover, they do so cooperatively and proactively. Cars and infrastructure constantly monitor their surroundings and will warn nearby or approaching vehicles of a patch of black ice, a vulnerable road-user, or an emergency braking manoeuvre, all with the aim of making roads safer, more efficient and easier to use.

It is like an ‘automobile internet’ and, like the internet, it requires dozens of enabling technologies, from telecoms hardware to data transport software, protocols and application programs.

"Where possible, of course,” explains Paul Kompfner, Head of Sector Cooperative Mobility at ERTICO - ITS Europe, and coordinator of the CVIS project, “we have built upon existing technology and standards."

Keep CALM

The ISO CALM standards are a case in point. CALM stands for 'continuous air interface for long- and medium-range communications'. This family of standards specifies a common architecture, protocols and interfaces for wired and wireless vehicle-infrastructure communications.

It was designed for robustness and reliable performance in the extremely dynamic traffic management environment, an environment where there are many actors all moving simultaneously, and where even the traffic light timing is constantly and unpredictably changing as it adapts to the current vehicle flows. It is an extremely tough communications scenario.

Crucially, CALM’s job is to maintain a continuous connection to a vehicle by managing access to a wide range of standard technologies like GSM, UMTS, satellite, infra-red, 5Ghz micro-wave and mobile wireless broadband like Wi-Fi and WiMAX.

"In CVIS, we did a lot of work to help finalise the CALM standards, to

develop them in the most open, universally applicable way," Kompfner explains. "But within the CVIS project we use CALM-compliant equipment almost like a 'black box', a stand-alone, all-in-one communication solution for cooperative traffic systems. It should provide connectivity to a vehicle travelling anywhere in Europe."

Essentially the same 'black box' can easily be adapted for use in both fixed roadside units and in mobile cars, trucks, motorbikes, and even pedestrians' handsets.

Just adding a standard communication package is a revolutionary step forward in traffic management systems, which are notoriously non-interoperable. It also reduces risk for automotive manufacturers that the communication unit they build into new vehicles will not be outdated before they hit the showroom. It means that both car and infrastructure manufacturers can be confident that their system will be able to work everywhere.

"A lot of the top carmakers already have incredibly advanced applications in their high-end vehicles, like software that can tell when a light will change, but they all work on proprietary systems, so they cannot work together," explains Kompfner.

Proprietary systems cannot scale economically unless they become the most successful technology. Achieving dominance is itself a lengthy, uncertain and above all expensive process.

Removing uncertainty

Developing a universal communication standard removes that uncertainly. Once the communications technology is in place, clever application developers can come up with all sorts of ways to take advantage of it.

For example, many cars with the lowest emission scores achieve their performance by turning off the engine at traffic lights. By communicating directly with the nearest traffic lights, a car could restart just in time for the green phase.

This would work even more efficiently, however, if the cars could avoid stopping altogether, the driver keeping to a suggested speed that would ensure arriving during the green. And even better would be to adapt the traffic signal timing to match the approaching vehicle flows. This is just what the CVIS cooperative traffic control achieves, with time savings of up to 20 percent compared to today's systems.

It is good to talk, but it is perhaps more important to understand each other, too. Just adding a communication layer to traffic is not very helpful in itself. So CVIS has developed software that can bring in external, online information services.
For example, a new service might collect current traffic conditions and weather, combine that with data from Galileo or GPS and offer the drive a live, real-time weather and traffic forecast for the next 10, 20 or 50km of the journey.

Mash-ups, new services that bundle together stand-alone information like real-estate listings and maps to create powerful new applications, are hugely successful on the internet, and CVIS ensured its platform could offer the same unlimited openness.

Unimagined functionality

By developing this open application management middleware, CVIS has made it easy for application developers and service providers to offer new products, with functionality that remains as yet unimagined.

The middleware also separates the pure communication tasks from the

high-level applications, thus enhancing security by keeping elements of the system separate.

But that is just the very beginning of what cooperative, intelligent traffic systems can achieve. CVIS partners have created many demonstrator programs in test sites across seven countries in Europe.

A dynamic lane management application can, for example, temporarily change the status of bus lanes or the hard shoulder to adapt to current traffic conditions. A filling station application can find and guide you to the nearest station for your actual route and fuel reserve. It can even take account of your preferred brand of petrol and today's prices.

The eCall, or automatic emergency call, is a compelling application for alerting the emergency services to an accident even should the driver be unable to call for help, while other applications like car-pooling, collision warning, and vulnerable user warning can dramatically enhance safety and economy.

The list of potential applications is almost endless, and once an open platform accepting third-party applications is available then a developer community will spring up to create further new services.

So the vision is firmly established and by providing the enabling technologies CVIS has fulfilled a remarkably ambitious research agenda. Now the question remains, how will society move from the laboratory to the real world, deploying along the 100,000s of kilometres of Europe's roads and streets? Stay tuned...

More information: CVIS project -- www.cvisproject.org/

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