

REALTIME SPEED LIMIT MAP ON ROAD WORKS TO IMPROVE SAFETY

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French motorways companies with the cooperation of ASFA have begun to work since the beginning of year 2006 on a new project about on board information on road works speed limits. The goal is to alert the driver through the navigation system about the current speed limit when passing nearby a road work. This project described in this short abstract is more than a simple case study as it claims to become operational in a medium term.

In France, on motorways, 80 000 road works are raised annually for maintenance or enlargement purposes. These road works are necessary for driver's safety, comfort and mobility but must also be considered as a crucial safety issue. Dealing with a different kind of road works requires important efforts to supply maximum safety for drivers and to protect road workers. During year 2005 135 road hazards have involved road workers.

In this context, motorways companies are currently setting up a process to collect all speed limits on their network. In particular, two companies: ASF and ATMB have begun to create an automatic process to collect all dynamic speed limits induced by road works on their network. Autoroutes-Trafic is the operational platform that puts together all the data and provides these speed limits to partners. The complete deployment (up to the drivers) of the project is currently being studied. Road works speed limits will be transmitted in real time through RDS TMC to navigation systems. RDS TMC protocol, already in use to transmit traffic messages in real time, is based on radio technology to carry information. Navigation systems will then be able to warn the driver in advance before a road work to help him adapt his vehicle speed.

For motorways companies, this technical innovation is an opportunity to supply a new service to drivers to the benefit of an improved safety and a better mobility nearby road works.

On motorways, the average speed of motorists has dropped by 5 to 6% in three years and the number of fatalities has been cut by 35%, including two-thirds, which are directly due to reduced speed.

CREATION OF A DATA BASE

A unique data base is gathering permanent and temporary speed limits. The Static speed limits are those for a road in a normal state (special road profile, for example). They are set by police orders, in co-operation with motorway companies and only rarely change (about ten changes a year over the whole network).

All companies agreed to quickly set up static speed limit collection. This work was performed in May 2006, from police orders available to concessionary companies.

The Autoroutes-Trafic economic interest group is in charge of centralising data. A full common database was produced in June 2006, from corporate data. A data check process based on a map available via the Internet will enable to perform initial validation, then update speed limits.

Motorway companies have three aims in collecting static speed limits. The first aim is to produce a map available via the Internet (www.autoroutes.fr: site of the concessionary companies), enabling to display all speed limits to road users, as well as explain their consistency and logic in order to become a tool in speed limit awareness campaigns. The second aim is to work with route providers (Mappy, ViaMichelin, etc ...), in order to display sections with speed limits below 130 km/h (like static speed checks presently). The last and most important aim is to transmit these speed limits to drivers, aboard their vehicles, while they are driving. For this, the database could be included in various on-board navigation systems, via a partnership with the mapmakers that produce updating CD/DVD for terminals.

TEMPORARY AND VARIABLE SPEED LIMITS

So-called temporary or variable speed limits are those linked to causes limited in time. They involve speed limits due to the presence of traffic guidance equipment (road works, etc.) – temporary speed limits - and speed control operations – variable speed limits -, like those performed on the A7 motorway, which will be generalised in the next few years.

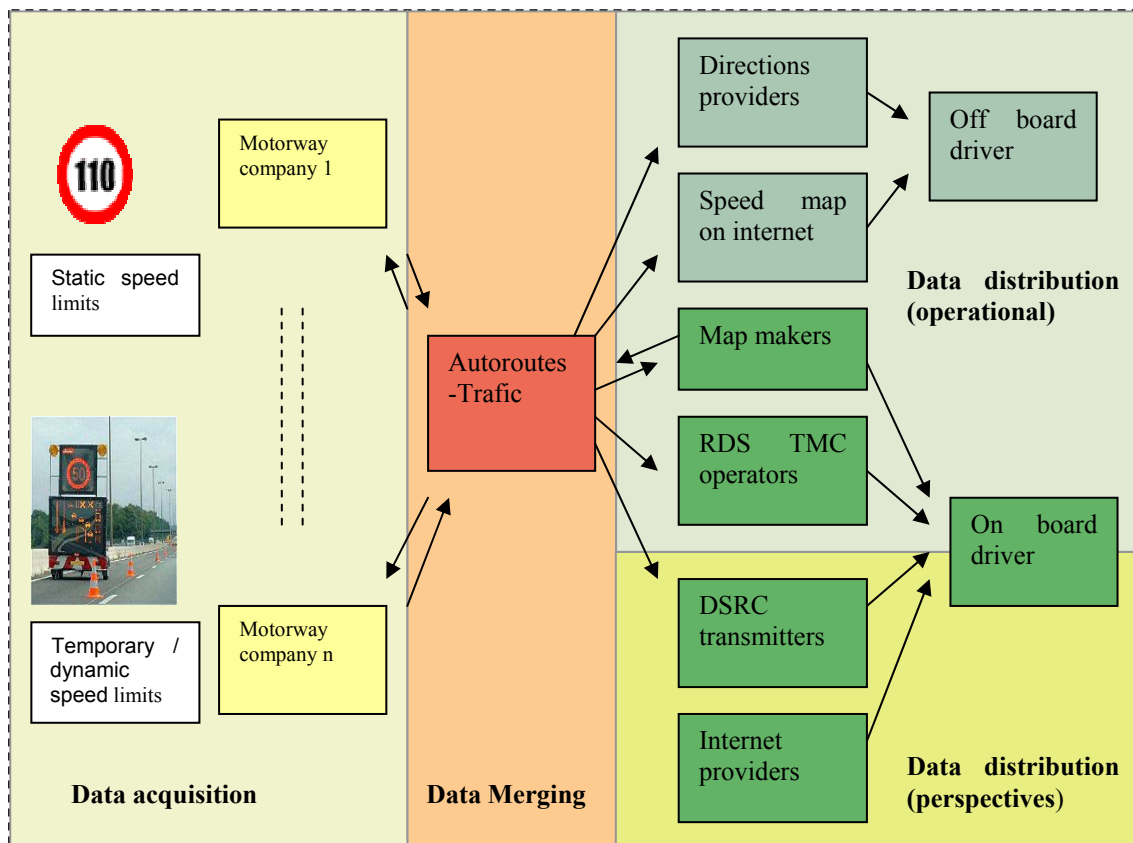
Collecting and transmitting these limits is both a major driver safety and comfort element, but also important for field staff.

The technical stakes linked to collecting and transmitting these temporary speed limits to vehicles are more complex than those generated for permanent speed limits. Indeed, collecting temporary speed limits must be performed in real time and thus, automatically. Therefore, this will not result in extra work for operators, but require setting up a computer process in the motorway company network's operating system. Two companies are currently testing this innovation's implementation: ASF (Southern France motorways) and ATMB (motorway and tunnel of Mont Blanc).

Autoroutes-Trafic is in charge of centralising "temporary speed limit" events from various companies, collecting and converting them into a format that can be used by external partners (converting reference points localisation , called "kilometre posts" (mileposts) into geographic co-ordinates, for example).

If the motorway companies are pioneers in the operational implementation of transmitting temporary speed limits to drivers, this approach is part of the continuing development of on-board services to drivers.

Global information flow diagram



DEMONSTRATION

A first large-scale test enabled to successfully check this innovatory project's feasibility. Representatives from motorway companies, authorities and the European Commission were invited to take part in a demonstration day organised by ASFA near Bonneville, on 12 June 2006.

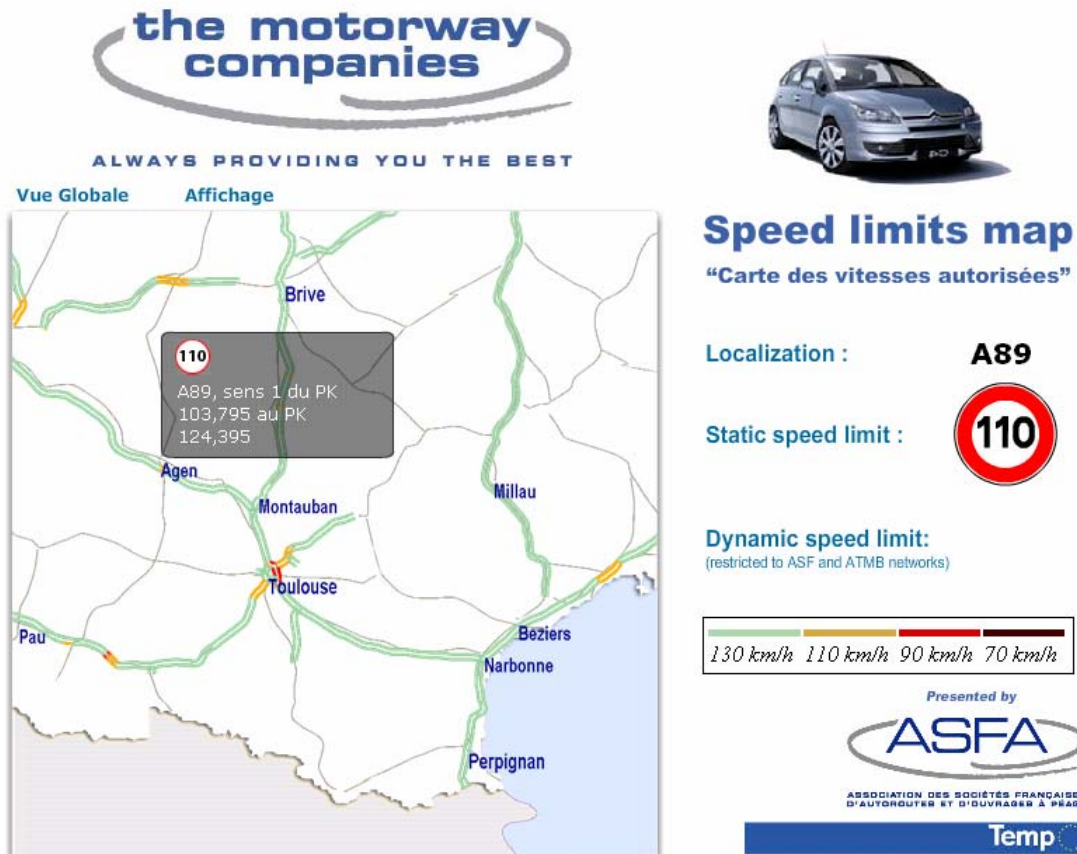
A vehicle specially equipped by the Robotics Laboratory of the *Ecole des Mines de Paris* and the national research institute for computing and automation (INRIA) travelled on a section of the A40 motorway between Cluses and Bonneville, transmitting the current, static or temporary, speed limit to the driver, according to circumstances, as the given route made the vehicle travel in a work site area limited to 90km/h. Data used for the demonstration was provided by ATMB, via Autoroutes-Trafic, thus proving that the full line of information operates correctly.



Transmitting real-time speed limits

SPEED LIMIT MAP

A map, via Autoroutes-Trafic as the system's operational platform, gathers together all permanent and temporary speed limits (for work sites on ASF and ATMB networks) for light vehicles: 130, 110, 90 km/h, etc...



It will initially be available on the motorway company portal: www.autoroutes.fr, to inform drivers before their departure. Action could be engaged with route providers to display this information, as is presently the case with static speed checks.

DEPLOYMENT PROSPECTS

Beyond the demonstration and Web map, the project must result in real implementation, thus transmitting speed limits to drivers, which is already the case via partnerships with other participants.

For static speed limits, once the database has been collected by Autoroutes-Trafic, this information should be transmitted to vehicles via mapmakers' CD-ROMs and DVDs.

For temporary speed limits, the link between Autoroutes-Trafic's real-time database and vehicles requires a communication mean between an infrastructure equipped with the database and vehicles. There are various possible channels: GPRS (but few vehicles are currently connected), RDS/TMC (Radio Data System – Traffic Message Channel: all vehicles can receive it, but not all present navigation system receivers can interpret speed limit-type messages). Conceivable participants are traffic information providers, which already transmit real-time data to vehicles.

The interfaces (visual, sound, etc...) that will transmit information to drivers in vehicles must be studied and developed with the support of car manufacturers. An ever-increasing number of vehicles are equipped with the GPS navigation system (in 8% to 20% of new vehicles, according to manufacturers), even if they remain a minority. Also, there is currently a boom in the mobile navigation systems market (PDA + GPS, i.e.: TomTom, etc...): in 2006, over 12 million of these devices were sold in Europe.