INTELLIGENT SPEED ASSIST IN WESTERN AUSTRALIA
– WHERE HAVE WE BEEN AND WHERE ARE WE GOING?
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INTRODUCTION
Excessive speed is a widespread social problem, which affects the entire road network. In Western Australia around 40 per cent of drivers are travelling at speeds above applicable limits [1]. The majority of speeding drivers exceed limits by small amounts, but a proportion (around 10 per cent in WA) travel at speeds more than 10 km/h above the limit.

The significant adverse road safety impacts of higher vehicle speeds have been confirmed by extensive research. The relationship between fatal and serious injury crashes and speed has been studied by many researchers, including Nilsson [2] in Sweden and Kloeden et al [3] in Australia. The overwhelming conclusion is that small reductions of speed can lead to significant savings in casualty crashes and the resulting road trauma.

The use of Intelligent Speed Assist (ISA), as part of an overall speed management strategy, now has widespread acceptance among road network and safety agencies within Australia. On the back of this acceptance, a number of Australian jurisdictions have commenced projects that aim to demonstrate the benefits and functions of ISA.

THE WESTERN AUSTRALIAN ISA TRIAL
In late 2006, Main Roads Western Australia, in conjunction with the Department of Premier and Cabinet’s Office of Road Safety, collaborated with the Victorian Transport Accident Commission (TAC) to demonstrate the utility of advisory ISA in reducing speeding in these two states.

The Western Australian demonstration project, which formally commenced in November 2007, aims both to stimulate interest in ISA from key opinion leaders and to establish and evaluate the system architecture that is required to support widespread rollout of ISA technology.

The main focus of the WA trial is on advisory ISA technology, rather than intervening systems. In recognition of the importance of up to date speed limit information to users, the WA project is also trialling as a second phase, technology that wirelessly transmits speed limit map updates from roadside beacons to ISA-equipped.

In the first phase of the trial 35 vehicles were equipped with an advisory ISA system developed by ACS Speedshield. The WA ISA unit involved three main in-vehicle hardware components, namely the Personal Digital Assistant (PDA), which provides the visual and audible display, the GPS antenna, which receives signals from the satellite; and the computing hardware that determines the location of the vehicle and matches the position to the applicable speed limit and actual vehicle speed.

Preliminary results from the first phase of the WA trial reveal that feedback on the concept of advisory ISA has been generally positive. However, a number of technical challenges have been identified, including map accuracy and functionality of the display.

Phase 2 of the WA trial is due to commence, with installation in the Perth metropolitan area of a number of transmitting radio beacons that will wirelessly transmit speed limit map updates to participating vehicles. This has involved the development of specialist software that captures the changes made to the central speed limit database and transmits the changes to the ISA units in the correct format.

DIRECTIONS FOR ISA WITHIN WA
ISA and its potential to improve road safety has been under consideration for a number of years in Europe. Europe sees a big potential in the growth of in-car navigation systems and are actively working on enhancing digital maps for use in Advanced Driver Assistance Systems (ADAS), of which ISA is one type.

A major outcome of the European work has been the development of a deployment ‘roadmap’ for advisory ISA, divided into three main phases.

- Phase 1 - Advisory ISA systems, based on digital map data covering static speed limits with limited coverage (motorways and main roads), together with update of speed limit data through new map CD/DVD release.
- Phase 2 - As for Phase 1 but with a complete road network coverage (including urban and rural roads), and possibility for more frequent incremental map updates of static speed limit data.
- Phase 3 - Cooperative systems that cater for both static speed limits contained in on-board maps and temporary and dynamic speed limits communicated to the vehicle from roadside infrastructure or other source.

The three phases of deployment can be considered as three generations of ISA applications, with each generation becoming more advanced as the supporting infrastructure (maps and communications) are developed over time.

The WA experience with ISA to date has shown that, while ISA has reached a level of technical maturity where it can be implemented in real-world applications, there are still many outstanding issues that need to be resolved.
before a State-wide deployment of 2nd and 3rd generation ISA can be realised, particularly for supporting and limiting versions.

One of the high priority and short-term tasks is the availability of accurate and up-to-date speed limit data. Western Australia is in a privileged position in that responsibility for speed zoning and signing lies with a single agency, Main Roads WA. While digital speed zone information has been captured for all roads in the State, much of the updating and validation of this information is done manually and can be time-consuming. Feedback from Phase 1 of the WA trial has shown that for a higher acceptance of ISA, and therefore contribution to road safety, accurate speed limits must be procured and maintained.

The accuracy, reliability and currency of the speed limit information in map-based ISA systems is a critical factor in determining what form of ISA should be deployed and to what target markets.

Advisory ISA requires less attention to coverage, up-to-dateness and accuracy than supporting and limiting versions. The data requirements for widespread advisory ISA are similar to that currently required for other road network attributes contained in satellite navigation devices. In this regard, advisory ISA can be marketed to a wide range of driver groups.

Some immediate benefits of advisory ISA can therefore be realised if satellite navigation developers/providers are encouraged to include advisory ISA as an additional feature, at marginal development cost.

For limiting ISA to be an acceptable technology for particular driver/rider groups, the ISA system should ideally contain permanent speed limit data that is certified as accurate and current for all roads in the State. For a regulatory ISA regime, where speeding offences may be detected automatically and reported to relevant authorities, the speed limit information would need to be correct at all times. The system would therefore also need to have the ability to cater for dynamic or variable speed limits which change due to weather or traffic conditions.

CONCLUSIONS

There is broad consensus in Australia and around the world that in-vehicle speed limit information and associated warning/active systems can significantly contribute to road safety targets.

To date, much of the work in Western Australia has been devoted to assessing and promoting advisory technology, as the least intrusive in terms of vehicle control and the type with the least stringent speed limit database requirements.

It is the view of WA road safety agencies that, in these early stages of implementation, the greatest benefit from ISA will come from the potential small reductions in speed made by the large number of drivers who speed by small amounts, rather than larger speed reductions from a small population of excessive speeders.

Once the ISA architecture is proven to be robust, secure and reliable, more effort can be given to examining the use of intervening and data logging/monitoring systems for particular driver groups.

The ultimate goal for ISA in WA is for the deployment of a fully cooperative system where full, accurate and current databases of permanent static speed limits are enhanced by real time changes in speed limits.

While Western Australia has captured speed limit information for all roads in the State, it must continue to work on speed limit data collection and maintenance to ensure deployment of second and third generation ISA. This includes the development of more sophisticated internal systems for the timely capture and validation of speed limit changes in the road agency central digital database. A national protocol for the certification and release of road agency speed limit information to third parties such as map providers also needs to be considered.

In the interim, the focus for Western Australia will be to encourage the uptake of advisory ISA among drivers, including Government fleets.

In this regard, WA supports the Australian ISA Initiative in working with industry to incorporate advisory ISA with good road safety functionality into satellite navigation devices.

REFERENCES