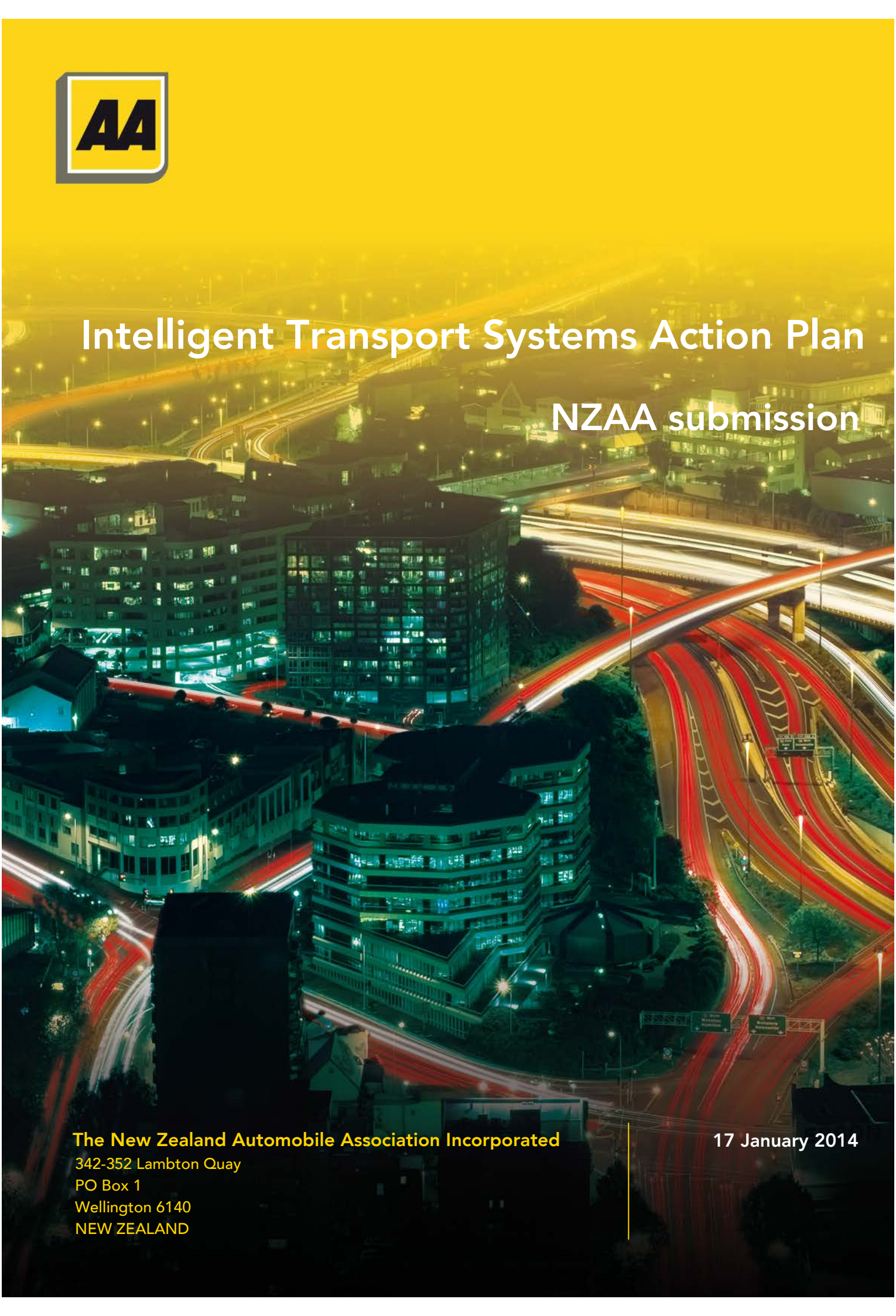
Intelligent Transport Systems Action Plan

NZAA submission



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SUBMISSION TO:	Ministry of Transport
REGARDING:	**Intelligent Transport Systems Action Plan**
DATE:	17 January 2014

ATTENTION:	ITS Action Plan
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NOTE TO REQUESTOR

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Background on the New Zealand Automobile Association

The NZAA is an incorporated society with 1.3 million Members. Originally founded in 1903 as an automobile users advocacy group today it represents the interests of road users who collectively pay over $2 billion in taxes each year through fuel excise, road user charges, registration fees, ACC levies, and GST. The NZAA's advocacy and policy work mainly focuses on protecting the freedom of choice and rights of motorists, keeping the cost of motoring fair and reasonable, and enhancing the safety of all road users.

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Origins of this Submission

This submission is in response to the draft ITS Action Plan 2014-18

Executive Summary

The AA commends the Ministry of Transport for the production of this timely and important action plan. Intelligent Transport System technology is a revolutionary movement toward the integration and embedding of information systems technology in the interfaces between the various elements of the transport system. As such its implications are considerable.

That said ITS is a tool, not a goal in itself. The key question this Action Plan does not sufficiently address is what is ITS for? Is it for the benefit of road users (why consumers typically buy technology), the benefit of transport system operators, to reduce costs to New Zealand, or all three? The AA finds this action plan to be light on policy objectives and guiding principles and rather heavy on technological examples. If we are not clear what problems we are trying to solve with these technologies New Zealand may either end up implementing expensive technological orphans (such as the Northern Gateway toll system) or failing to obtain value for money by missing opportunities from commercial-off-the-shelf applications or whole-of-government value-equations.

Part of the problem with ITS is that it requires agencies which have not, traditionally, had much interaction, to solve very complex and uncertain trade-offs simultaneously. Determining how this should be done should be investigated before attempting to actually do so.

One tool which would be very helpful would be the development of a technology price-point frame-work which established a priori the feasibility of implementing various opportunities from emerging technology. This would allow transport system designers to track technologies which could be used in place of infrastructure construction or other conventional solutions.

For example at the moment the cost to the consumer of a basic vehicle monitoring telematics package starts at around $45 per month. This can be justified by fleet operators wanting the benefits of fleet management but not by many private citizens. By contrast the overhead cost to the consumer of the administration of the fuel excise is practically zero. Tracking the market cost of vehicle telematics will help determine probable supply and demand curves and assist with predicting an optimal point where Government can replace fuel excise with eRUC technology.

ITS raises a number of questions of principal on the relationship between the individual transport system user, corporate operators and the state which need to be resolved in principle before the technology is implemented. The AA is happy to assist Government through its Member research programme to establish the expectations and beliefs of New Zealand transport users with regards to the opportunities ITS presents.

Recommendations

The AA recommends more attention be focussed on clarifying the objectives and principles of ITS in the Action Plan.

The action plan should include a technology and regulatory forecast to stimulate policy development in anticipation of technology change and important changes in technology price-points.

The AA recommends the Government establishes the principles and whole-of-government framework for governing its interventions in the ITS marketplace.

The AA recommends an open market approach to geo-spatial and positioning services.

The linking of smart-phone number, credit card and vehicle registration in NZTA databases has privacy implications which deserve wider consideration.

The AA recommends that the principles of reasonable tolerance be established before ITS enforcement systems are implemented.

1. Strategic context

1.0 Significance of the car and the smart-phone to New Zealanders

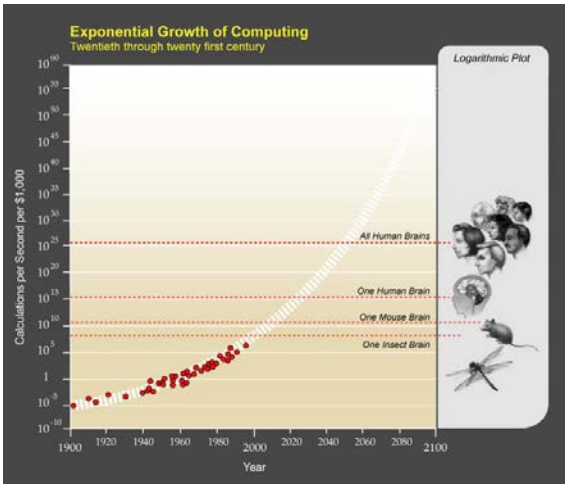
In New Zealand there are 2.6 million cars cumulatively clocking up 37 billion kilometres per year making it the country's most important transport system. Its users fund over half of the New Zealand Land Transport Programme and the total value of the fleet is about $15 billion. Cars are typically the second most valuable asset owned by New Zealand households with a gross annual insurance premium of $1.3 billion (30% of the total insurance market). No other transport system comes close to the economic and social importance of the car.

Simultaneously the New Zealand public is investing heavily in smart-phones. There are now over 2.5m smart phones in New Zealand and vehicle manufacturers are pressing to integrate this capability into vehicle systems through Bluetooth, USB and wifi channels. Exactly how the phone as a source of driver communication/distraction, direction, information and entertainment can be safely integrated into the driving environment has not been established. The same is also true of near-future wearable digital devices such as watches and sight-augmenting digital devices such as Google Glass. Although hand-held mobile phone calling and texting while driving was banned as of 1 November 2009 under the Land Transport (Road User) Amendment Rule 2009 it is not enforced sufficiently to warrant much deterrence. In June 2013 the MoT conducted a survey at 52 sites which found 1 in 40 drivers were using a hand-held cell-phone to talk or text (or email) while driving.

The European Union has mandated the eCall airbag-triggered emergency call and locator system for all vehicles by 2015. While this system is operated privately by Bosch (the airbag manufacturer) it is an example of regulation driving the integration of telecommunications and transportation for a public good benefit.

The development of cars as network devices in their own right is also proceeding globally. Many car parts retain Radio Frequency ID tags used for logistics after assembly. Automotive manufacturers are also developing systems whereby the maintenance management of vehicles can be carried out largely by the manufacturer through telematic links between the vehicle's engine management system and the manufacturer. Both create potential risks and opportunities for consumers.

The processing speed of computers is increasing largely in accordance with Moore's Law.



This makes autonomous vehicles inevitable within the decade. Major automobile manufacturers and technology companies have made numerous predictions for the development of autonomous car technology in the near future. According to the summary on Wikipedia:

 The 2014 i3 BMW will autonomously steer, accelerate and brake in traffic jams at up to 25 miles (40 km) per hour.
By 2014, Volvo expects vehicles that can be autonomous at up to 31 miles (50 km) per hour, with expected use in heavy traffic.
By 2015, Audi plans to market vehicles that can autonomously steer, accelerate and brake at lower speeds, such as in traffic jams.
By 2015, Cadillac plans vehicles with "super cruise": autonomous steering, braking and lane guidance.
By 2015, Nissan expects to sell vehicles with autonomous steering, braking, lane guidance, throttle, gear shifting, and, as permitted by law, unoccupied self-parking after passengers exit[1]
By Mid-2010's, Toyota plans to roll out near-autonomous vehicles dubbed Automated Highway Driving Assist with Lane Trace Control and Cooperative-adaptive Cruise Control.
By 2016, Tesla expects to develop technology that behaves autonomously for 90 percent of distance driven.
By 2018, Google expects to release their autonomous car technology.
By 2020, Volvo envisages having cars in which passengers would be immune from injuries.
By 2020, Mercedes-Benz, Audi, Nissan and BMW all expect to sell autonomous cars

While the Institute of Electrical and Electronic Engineers (IEEE) has predicted 74% of all vehicles on US roads will be autonomous by 2040 this is likely to be delayed a decade for the largely second-hand New Zealand market. So far the Government has not addressed the issues this transition could create. The timeline referred to above suggests that considerably more attention needs to be focussed on the implications of these technologies from a policy and planning perspective.

For example the Infrastructure 2012 report refers to road pricing technologies (p16). At present, however the lowest cost private telematic vehicle monitoring package costs around $45 per month due to carrier network charges. At this sort of price electronic road user charges cannot be a cost-effective alternative to fuel excise making the prospects of road pricing rather remote.

The Government should have some sense of how competitive New Zealand's environment is for the introduction of ITS technologies. It is one thing to talk about future possibilities but there may be more regulatory and economic hindrances to delivering on those technological possibilities than is realised. By benchmarking against other jurisdictions the Government would could compare outcomes more effectively.

AA Recommendation: **The action plan should include a technology and regulatory forecast to stimulate policy development in anticipation of technology change and important changes in technology price-points.**

The AA does not intend to recommend any particular strategic direction here but suggests that more clarity on the Government's core objectives for ITS would be helpful.

The AA recommends more attention be focussed on clarifying the objectives and principles of ITS in the Action Plan.

1.1 Objectives of intelligent transport system action plan (draft plan section 2.2)

Traditionally New Zealanders have purchased technology from international manufacturers. ITS represents an integration challenge to Government agencies. While Governments and local government can reduce this challenge and deliver applications through standardisation or implementation of specific solutions this, necessarily, precludes other options. The Government will need to establish the objectives of its ITS action plan the basis on which these standardisation trade-offs are managed.

The objectives for a whole-of-government ITS action plan as set out in the draft (page 6) are based on a selection of the Connecting New Zealand transport objectives statement. The plan states the objectives of an ITS plan are to be: 1 “Effective, move people and freight where they *need* to go in a timely manner”; 2 “Efficient, deliver the *right* infrastructure and services to the *right* level at the best cost”; 3 “Resilient, Meet future needs and endure shocks”; 4 “Safe and responsible, reduce the harm from transport”.

The objectives for the ITS plan are important in that they should guide trade-offs and other policy. Unfortunately these objectives are not particularly rigorously analysed.

The implied value judgement in the use of the word “need” in objective 1) raises questions of “want” vs “need”. Who decides when someone “needs” to go anywhere? Do 40,000 people “need” to go to Mt Eden to see a rugby match? Having paid a significant ticket price to do so they clearly “want” to go to a rugby match, but do they “need” to go when they could see it on television? The Government is not in a position to assess the “need” for travel by individuals. Some reference to market demand should be inserted instead ie “move people and freight in accordance with market demand”.

The objective of delivering “the right infrastructure and services to the right level at the best cost” raises the question as to what the “right” infrastructure and level may be. The Government’s supply of transport infrastructure is ultimately a political decision in response to economic and political demands. Therefore “right” is a political judgement call not a technical one and outside the scope of an ITS plan.

According to “Connecting New Zealand”: “The government is seeking an effective, efficient, safe, secure, accessible and resilient transport system that supports the growth of our country’s economy, in order to deliver greater prosperity, security and opportunities for all New Zealanders.” These objectives are a party political list of Government priorities. Other governments may have different priorities during the next decade. While the Government is an important player in transport most ITS technology will largely be adopted by consumers incorporated into solutions they are buying anyway (e.g smartphone technology and vehicles). Government sponsored solutions (e.g. eRUC or electronic tolling) typically leverage off this investment to provide better Government services.

At the same time the action plan objectives should stipulate some form of priority order rather than list all possible goals. If, for example, the draft plan’s paragraph 2.3 “Ability for ITS to create high value jobs” is a prime objective then this would (as it does, for instance in Singapore) be a key motivator to Government strategy. If the prime objective is “reduced direct and indirect costs for transport users” that will motivate the ITS strategy in a completely different direction.

The objective of privacy is not incorporated here at all. For example it was possible for the Government to mandate an electronic road user charge system which effectively allowed it to track every New Zealand vehicle. Instead it has chosen to tap into private sector investment in fleet management systems which effectively precludes this option. But this should be a matter of policy and principle (that the Government should not track all New Zealanders) not a matter of cost or changing technology may open the way for unprincipled surveillance.

At the same time the use of surveillance cameras in Traffic Operations Centres also raises questions of privacy and the role of the state. AA Members appear to be comfortable with the principle that a public street is not a private place. There appears to be more comfort with state surveillance of public spaces if this surveillance is accessible to the public as well. While there is no question the street is a public place New Zealanders may consider the inside of their car a private space. Surveillance which intruded on the interior of the vehicle may be regarded as intrusive.

It would be preferable to have such principles and objectives set out explicitly.

The AA does not intend to recommend any particular strategic direction here but suggests that more clarity on the Government's core objectives for ITS would be helpful.

The AA recommends more attention be focussed on clarifying the objectives and principles of ITS in the Action Plan.

1.2 Government's Strategic Approach

The Government's role in strategic leadership will depend very much on the Government's objectives. **ITS is a tool, not a goal in itself.** This means the proposal in the draft plan that the Government will "provide a supportive regulatory environment" makes no sense without a clear idea of what the objectives for the technology are.

For example if the Government wishes to introduce road-pricing in order to bring congestion externalities into trip decisions in order to reduce congestion and defer large-scale infrastructure spending it needs to have some idea of what costs and benefits it is seeking to balance. A change to telecommunications regulations may be needed to reduce the network costs to make such road-pricing feasible. Such a change is for the objective of reducing congestion and deferring large infrastructure *not* for the objective of supporting the introduction of ITS technologies per se. Central and local government therefore needs to bring ITS costs and opportunities into their strategic planning.

Some Governments (e.g. Singapore) assume development risk of ITS technologies in advance of international standards because the benefits of a bespoke solution outweigh the costs. As an insular jurisdiction New Zealand is under no compulsion to adopt international standards in the land transport arena. The only benefit of doing so is to achieve better value for money. The Government needs to establish the principles governing its own investment in ITS solutions. Taking the example of road pricing technology it may find a better cost-benefit from road pricing technology development than infrastructure construction.

Because ITS is a whole-of-government Action Plan there is a need for some form of whole-of-government cost/benefit analysis so that changes in one field (e.g telecommunications) have a pay-back in another field (e.g local government or central Government infrastructure investment or ACC costs). Without this it will be very difficult to justify change.

Traditional roading engineers are not likely to develop ITS projects as non-tangible infrastructure alternatives to the tangible infrastructure they better understand. The Government needs to establish in advance a framework for ITS technology applications based on objectives, principals and predicted cost benefits and price-points. This framework would guide central and local government on ITS applications such as parking, tolls, enforcement and any other innovations.

The AA recommends the Government establishes the principles and whole-of-government framework for governing its interventions in the ITS marketplace.

2. Proposed Actions

2.0 Standards (p20)

The question of international standards adoption in ITS needs careful consideration. While Europe makes a great deal of its “international” (generally meaning European) standardisation processes most innovative telecommunications standards have come from the Institute of Electrical and Electronic Engineering (IEEE) in the United States. Japanese ITS innovations appear to be (if anything) more advanced but due to Japan’s insular geography there has not been much effort to promulgate these developments outside that country. To date only Korea has similar standards.

Dedicated Short Range Communications (DSRC) using microwave vehicle-to-infrastructure communications are a relatively old concept. The FTC dedicated 75Mhz of spectrum in the 5.9Ghz range to ITS applications in 1999 and the EU has dedicated 30Mhz since 2008. The IEEE developed the 802.11p or “Wave” standard in the 5.9Ghz band. That was completed in 2010 for ITS and has been partially supported by the EU’s ITS-G5 standard. Work is underway to make these standards compatible.

Japanese DSRC technology has relied on the 5.8Ghz band since 2009 and ten million transponders have been sold for electronic toll collection. The whole 2.4 to 5.875Ghz spectrum is in the international Industrial Scientific and Medical unallocated band. Five Gigahertz high frequency signals are short-ranged, highly directional and have been used for a wide range of applications including the latest 5.8Ghz 802.11ac “Wifi” to unoccupied aerial vehicle (UAV) video streams. Many ITS manufacturers have built transceivers for both the 5.8Ghz and 5.9Ghz range.

Both standards are supported by toll-gate firms such as Kapsch, however such firms tend to aggressively use standards to reduce competition. While such firms favour DSRC it is not necessarily the only way to achieve ITS objectives.

The Wi-fi standard (5.8Ghz) and Bluetooth (2.4Ghz) are more likely to be more widely implemented in smart-phones, tablets and similar consumer devices bought by households for a variety of applications. Near field communications (NFC) is built on these facilities and Radio Frequency Identification technology. For some applications (e.g. electronic tolling, registration enforcement, and parking etc) NFC or Radio Frequency ID tags are a better option than DSRC and in-vehicle transponders. NFC (ISO/IEC 14443) operates in the 13.56Mhz band with range of little more than 10cm but NFC Bluetooth versions in the 2.4Ghz band may operate up to 50m away. Some RFID tags use the 802.11 ISM frequency readers to read from distances up to 200m. In 2007 Bermuda mandated RFID tags for all vehicles to enforce widely flouted registration requirements. RFID tags cost a fraction of transponder prices. In the future NFC is expected to supplant “Paywave” contactless credit cards.

As ITS is not a goal or single technology in itself the AA does not recommend adopting ITS standards which might discriminate against the importation of used vehicles from Japan. A Commercial-Off-The-Shelf solution based on cheap RFID or existing NFC technology may well be better than dedicated ITS standardisation problems. This is where the technology framework and price-point study would be helpful in establishing the best cost-effective options.

2.1 Positioning and Geo-Spatial Mapping (pp24-25)

Simple GPS based navigation systems are not accurate enough for most ITS applications due to the vagaries of satellite attitude and signal strength. Based purely on GPS stationary vehicles can appear to make trips which are physically impossible. Internationally precise position augmentation services (using a variety of technologies) have been evolving for two decades to the point that cellular operators are combining it into their offerings. Centimetre-accurate precise positioning has been reported in scientific literature but augmentation coverage will remain an issue. NZTA is adopting a multi-agency standards approach to the problem of geo-spatial mapping and a similar approach for positional augmentation would be desirable.

The AA recommends an open market approach to geo-spatial and positioning services.

2.2 Charging and payment systems (p26)

Electronic (Numberplate Recognition) toll charging systems implemented to date (e.g. Northern Gateway) have been expensive administratively to operate and the low rate of adoption of similar tolling systems elsewhere has not helped reduce these transaction costs. Potentially charging systems could apply to parking, tolls, cordon tolls, HOT lanes and ultimately road pricing. In many cases charging will need to be linked to precise positioning. This will apply to lanes as well as parking places. NFC Bluetooth options may well appear for parking operators sooner than roading operators.

The linking of smart-phone number, credit card and vehicle registration in NZTA databases has privacy implications which deserve wider consideration.

2.3 Enabling compliance and targeted enforcement (p27)

There are a large number of potential compliance applications for ITS technologies. Practically compliance enforcement is a trade-off between non-compliance detection, the degree of non-compliance and the cost-benefit of applying sanctions. ITS technologies raise the spectre of non-compliance detection of the smallest infringements becoming almost perfect (e.g. vehicles immediately reporting speeds over legal limits). This raises the prospect of ITS technologies potentially being used to create a virtual Police-state.

AA Member surveys have found that motorists expect some tolerance for occasional lapses in time and degree. This strongly suggests that a degree of non-compliance tolerance needs to be incorporated into ITS compliance systems to allow for small, short-duration and unintentional transgressions inevitable due to human error (for example late vehicle registration, slight speed transgressions or minor over-stays in paid car parks). Establishing the principles for these tolerances should be part of the objectives and principles policy work required before contemplating any particular ITS solution.

The AA recommends that the principles of reasonable tolerance be established before ITS enforcement systems are implemented.

2.4 New Zealand as a test-bed (p31).

The suggestion that New Zealand can be used as a test-bed raises questions about the objectives of ITS in New Zealand. What, for example, is the benefit to the public of testing autonomous cars on our roads? The up-side is some research investment by large automotive corporates taking advantage of our ACC regime. The down-side is individuals being injured as a result of such testing going wrong. Having “New Zealand” listed as the first nation for an autonomous car fatality would not be any achievement. If New Zealand is to serve as a test bed

the benefits to New Zealand should be more than simply coolness by association. There should be clear and realisable advantage in achieving the objectives set for the technology.

2.5 User interface and the challenge of new technologies (p32)

The AA recommends that the Ministry of Transport conducts research into the issues and best-practice in this area.

3. AA Assistance

3.0 Member Research

ITS technologies are potential game-changers for policy implementation and commercial objectives across a range of applications. Some changes will involve testing questions of principle against ordinary New Zealanders. The AA has a member database of 1.3 million Members and considerable capability and experience at testing such matters very inexpensively.

3.1 Expertise

The AA is a trusted and informed commentator on automotive technology and can provide guidance where required. The AA is also a key partner for Government in many aspects of transport ranging from geo-spatial to tourism research. Obviously the AA has an operational interest in a range of commercial ITS technologies.

3.2 Regulatory Issues from Commercial ITS

The integration of vehicle manufacturers design, delivery and maintenance through vehicle telematics and the trend towards keeping design and manuals secret is creating a significant threat to the after-market, maintenance and services industries. Known as the “right to repair” issue the question becomes whether a vehicle is licensed intellectual property or a good with which the owner has the right to do with as they lawfully may. This issue may require regulatory intervention in the not-too-distant future.

The same issue also raises questions about the manufacturers access to information which may otherwise be regarded as private (e.g location).

Conclusions

The AA commends the Ministry of Transport for the production of this 2014-18 ITS Action Plan but suggests there is still a lot of important whole-of-government policy work required due to the revolutionary nature of the technologies under discussion.

The AA is happy to contribute to further development of the application of ITS in New Zealand.