NZ Transport Agency position statement on intelligent transport systems

Responding to the opportunities

New Zealand Government

OUR PURPOSE

CREATING TRANSPORT SOLUTIONS FOR A THRIVING NEW ZEALAND

NZ Transport Agency

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This publication is also available on NZ Transport Agency's website at
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FOREWORD

This document sets out the NZ Transport Agency's response to the opportunities presented by intelligent transport systems (often referred to as ITS) – exciting technological developments that are transforming the way we plan, invest in and manage parts of New Zealand's transport network.

Applied to traffic management, back-office systems and vehicles themselves, intelligent transport systems have an increasingly important role as key enablers of a transport system that is able to shape smart choices for customers across one network, support safer journeys, enable more efficient freight supply chains and deliver more enjoyable user experiences.

Making more effective use of constantly improving technology is a step change we are actively pursuing to maximise the potential of intelligent transport systems for New Zealand.

This document has been written for interested groups and individuals who:

- would like to improve their understanding of intelligent transport systems in relation to New Zealand's land transport system
- seek to understand the implications of intelligent transport systems for the operation of the land transport network and the Transport Agency's business
- seek to understand our perspective on, role in, and investment approach for intelligent transport systems
- are considering investing in intelligent transport systems themselves.

We're excited about the contribution intelligent transport systems can make to creating transport solutions for a thriving New Zealand and are committed to working with others to explore and clarify the opportunities. This document is an important step towards facilitating cross-sector discussion, and ensuring cohesion and consistency in our approach to using intelligent transport systems for the benefit of all New Zealanders.

Geoff Dangerfield

WE'RE EXCITED ABOUT THE CONTRIBUTION INTELLIGENT TRANSPORT SYSTEMS CAN MAKE

INTELLIGENT TRANSPORT SYSTEMS OFFER THE TRANSPORT SECTOR OPPORTUNITIES TO TAKE OUR PERFORMANCE TO THE NEXT LEVEL

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We invest in and support intelligent transport systems solutions that demonstrably contribute to our strategic objectives. This enables us to focus our limited resources where they'll add most value.

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We prefer a traveller-centric (rather than mode or road) approach, with customers at the heart of our business.

3.

We consider intelligent transport systems from multi-modal perspectives, integrating information and customer experience across modes.

4.

We encourage sector-led intelligent transport systems development and investment. This prevents us unnecessarily investing in or overregulating technologies, unless the investment is in an asset for which we're accountable.

5.

We're solution neutral and prefer to be a service provider of last resort.

6.

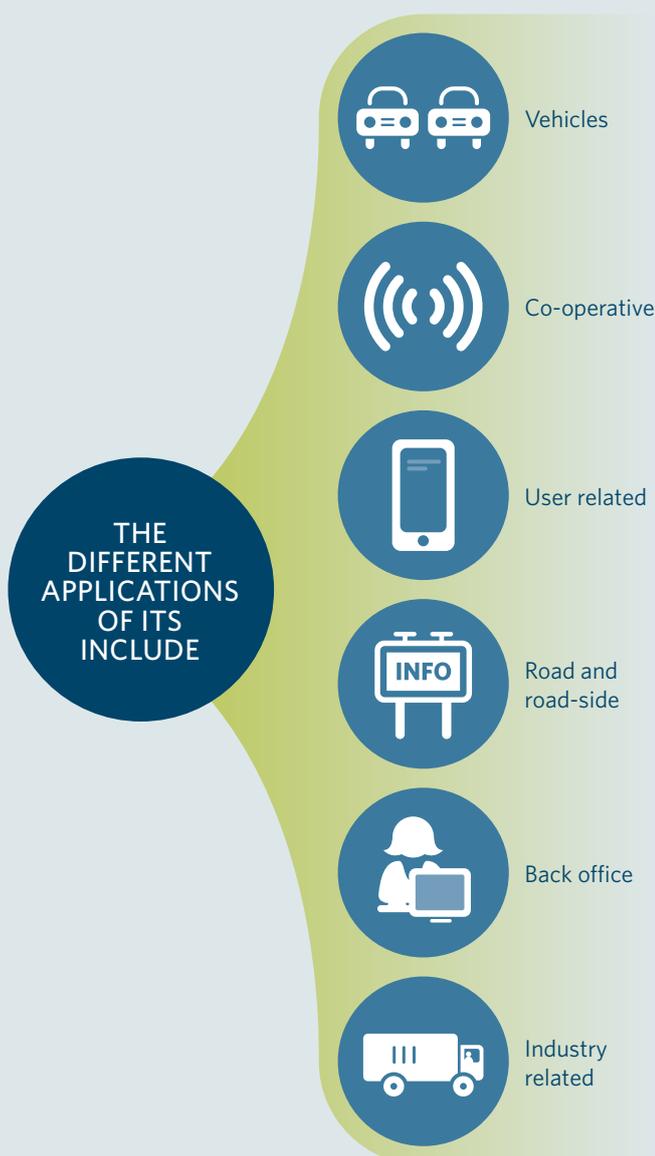We value traveller choice over administrative convenience.

SUMMARY

This document sets out the Transport Agency's response to the opportunities presented by intelligent transport systems (often referred to as ITS) – exciting technological developments that are transforming the way we plan, invest in and manage parts of New Zealand's transport network.

Applied to traffic management, back-office systems and vehicles themselves, intelligent transport systems have an increasingly important role as key enablers of a transport system that is able to shape smart choices for customers across one network, support safer journeys, and deliver more efficient freight supply chains and enjoyable user experiences.

WHAT ARE INTELLIGENT TRANSPORT SYSTEMS?

'Intelligent transport systems apply information and communication technologies that support and optimise all modes of transport by cost-effectively improving how they work, both individually and in cooperation with each other.'

THE DIFFERENT APPLICATIONS OF ITS INCLUDE

Vehicles

Co-operative

User related

Road and road-side

Back office

Industry related

THE OPPORTUNITIES

Intelligent transport systems offer the transport sector opportunities to take our performance to the next level – enabling dramatic improvements in:

- **the way we gather and use data about traffic flows and the state of the network:** smartphones and GPS-compatible devices, advanced roadside equipment (such as signs, gantries and sensors) and innovations that are turning vehicles into data-gathering machines are enabling us to see who's using the network, how they're using it, and whether it's performing optimally
- **the amount and quality of data:** having comprehensive, in-depth data is invaluable for our planning, investment and operational activities at local, regional and national levels, and for managing the risks and costs of network ownership and operation
- **our ability to communicate with travellers:** intelligent transport systems enable us to provide real-time information to travellers (via roadside signs, smart devices, etc) on network conditions, safe speeds, network incidents and alternative journey choices – with flow-on benefits in safety, convenience and journey efficiency
- **our ability to resolve operational issues in the transport network:** intelligent transport systems enable us to respond quickly to changing traffic conditions through interventions such as adjustments to traffic signals, variable speed and message signs, and ramp metering
- **our ability to protect people from their and others' mistakes:** active vehicle safety features and real-time safe speed messaging to drivers will help to reduce the incidence and severity of crashes.

TAKING A COLLABORATIVE APPROACH

This document is an important step for the Transport Agency – it outlines our views on intelligent transport systems, the opportunities it offers, and how we see our role in making intelligent transport systems an integral part of New Zealand's transport system.

We look forward to discussing the possibilities with other participants in the transport sector, including vehicle manufacturers and government partners such as the Ministry of Transport, the Ministry of Business, Innovation and Employment, NZ Police, local government and any interested sector groups. By sharing and understanding each other's perspectives, we believe we can achieve an effective consensus on intelligent transport systems to the benefit of all New Zealanders.
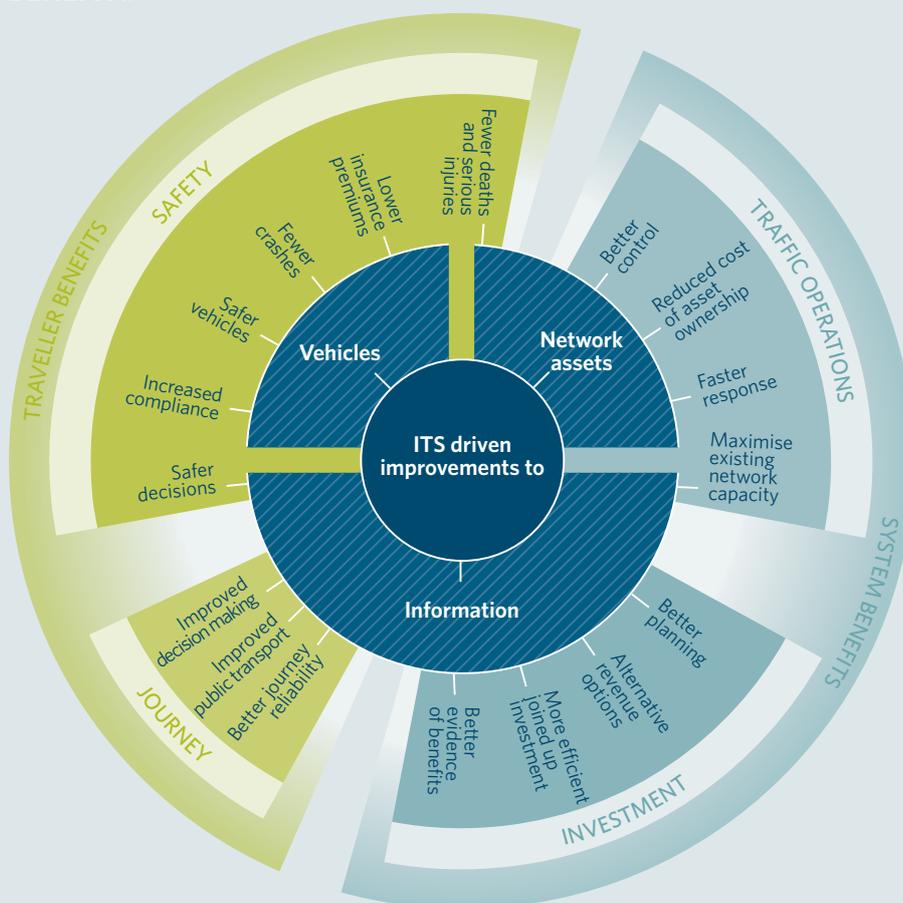
THE BENEFITS

FIGURE 2: ITS benefits wheel. A summary view showing how ITS technology advances to core aspects of the land transport sector to drive benefits for customers, investors and operators

THE CHALLENGES

Despite the many potential advantages and opportunities that intelligent transport systems present, the intelligent transport systems environment is complex, with many different solutions trying to address similar problems. Without strong leadership, potentially conflicting technologies, standards and perspectives may undermine the chances of consensus and successful delivery of the identified benefits.

Media stories and marketing have generated a lot of interest in and enthusiasm for vehicle-related intelligent transport systems, but conflicting views and complexities have given rise to some concerns. Are we as organised as we need to be to take advantage of intelligent transport systems? Are we already missing out on benefits achieved elsewhere in the world?

While these are issues that we need to address, it's important to note that the speed of progress in vehicle-related intelligent transport systems everywhere is closely allied to the time it takes to redesign and refresh the fleet. In addition:

- we can only enjoy the full benefits of intelligent transport systems by investing further in the transport network
- stakeholder and traveller expectations about the timeliness and accuracy of travel-related data will continue to increase
- game-changing improvements to information need proactive encouragement and facilitation.

OUR RESPONSE

We've already made a significant investment in intelligent transport systems in our roles as a regulator, network investor and operator. In assessing the future benefits and opportunities, we will take the same approach as that taken for any other transport investment; initiatives must meet our criteria for strategic fit, effectiveness and efficiency to maximise returns for New Zealand.

Our particular focus in this document is on the 12 medium-term goals articulated in our 2013-16 Statement of intent. We assess the ways that intelligent transport systems can contribute to each of our goals and identify where we need to go next to achieve them. This includes finding ways to:

- get real-time and historical information on traveller and vehicle movements to help in our planning, investment and operational activities
- get information to travellers that enables them to make smart transport choices (efficient, safe and responsible) and comply with speed and other advisories
- learn about, and control, the state of our roadside equipment, such as traffic signals and gantry signs, so that we can make effective real-time network management decisions and develop, maintain and upgrade the equipment appropriately
- reduce the incidence and severity of road crashes
- maximise journey efficiency
- match specific vehicles to particular locations and times on the network to provide tailored information to customers and, where relevant, enable accurate and convenient payment options.

WHAT ROLE SHOULD WE TAKE?

The Transport Agency could take on a wide range of roles in the intelligent transport systems area – from being a follower or influencer to facilitator, regulator, partner or investment lead.

By way of example, here are six intelligent transport systems opportunities that could require our involvement and to which we could contribute as investor, regulator, facilitator or influencer. Note they're organised by role, not by the relative significance of the interventions.

INTERVENTION	INVESTOR	REGULATOR	FACILITATOR, INFLUENCER
More active network management and speed advisories	✓		
Quality information about the state of the network (not the traffic flow upon it)	✓		✓
The ability to identify a vehicle accurately for regulatory or payment reasons	✓	✓	
Mechanisms to get more useful information to travellers and freight operators			✓
Quality aggregated information on the real-time (and historical) movement of travellers and vehicles		✓	✓
Advanced vehicle safety features to reduce the incidence and severity of crashes		✓	✓

WHERE SHOULD WE INVEST?

Our commitment to realising the full potential of intelligent transport systems as technological solutions requires us to invest in a range of intelligent transport systems initiatives – whether we're taking the lead, influencing market behaviour or funding interventions ourselves.

We've identified five intelligent transport systems-related investment areas that we believe make the greatest contribution to achieving our medium-term objectives.

These have been identified through an assessment of the potential benefits of intelligent transport systems, taking into account our likely overall level of investment and the expected impacts of intelligent transport systems in achieving our objectives over 10 years. Strong benefits with relatively low levels of investment scored well.

INTEGRATED NETWORKS FOR CUSTOMERS

Mechanisms for collecting quality data about the use of the network

Better-quality data to drive better operations, planning and investment

More active network management

SMARTER TRANSPORT CHOICES

Mechanisms that enable the delivery of accurate information to travellers to promote smarter transport choices

SAFER SPEEDS AND SAFER VEHICLES

Real-time safe speed messaging to drivers and/or vehicles

Increasingly active vehicle safety features

IMPROVED FREIGHT SUPPLY CHAIN EFFICIENCY

Better and more freight network data collection and use for enhanced network management and more efficient freight movements

INNOVATIVE PAYMENT, PRICING AND COMPLIANCE APPROACHES

Mechanisms that enable new payment, pricing and compliance options

Note that specific intelligent transport system benefits will be influenced by evolving technologies and market demands. We'll continually monitor the global transport sector to ensure that our intelligent transport systems efforts and investment practices are maximising returns for New Zealand.

GET INFORMATION TO TRAVELLERS THAT ENABLES THEM TO MAKE SMART TRANSPORT CHOICES

WHAT ARE INTELLIGENT TRANSPORT SYSTEMS?

WHAT ARE INTELLIGENT TRANSPORT SYSTEMS?

The definitions of intelligent transport systems are many and varied, and cover all aspects and modes of travel, from road and rail to maritime and aviation. We've chosen to adopt the definition used by the Intelligent Transport Systems Policy Committee of the International Road Federation:[1]

'Intelligent transport systems apply information and communication technologies that support and optimise all modes of transport by cost-effectively improving how they work, both individually and in cooperation with each other.'

This document applies the definition only to land transport. However, given that intelligent transport systems have the potential to support integrated land, maritime and aviation transport solutions, we are open to expanding our approach in the future.
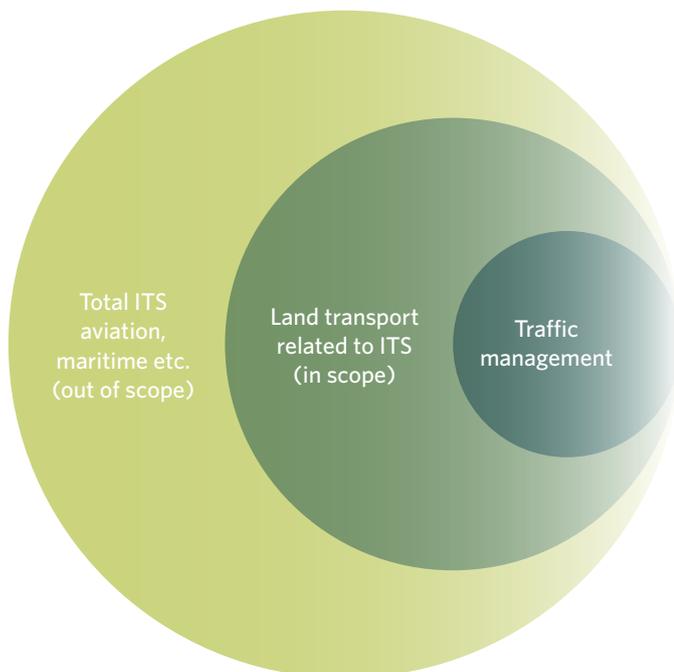

FIGURE 3: Showing the scope of this framework

Note that our definition excludes generic technologies that are not unique to intelligent transport systems. For example, business intelligence services are common to many of our business functions. As there's nothing in their requirement or implementation that's specific to intelligent transport systems, their development is covered under other Transport Agency initiatives.

MAKING SENSE OF INTELLIGENT TRANSPORT SYSTEMS IN PRACTICE

The intelligent transport systems Policy Committee of the International Road Federation describes six ways in which intelligent transport systems are applied: to infrastructure, vehicles, users, industries, 'cooperative' situations and back-office systems:

INTELLIGENT TRANSPORT SYSTEMS AND INFRASTRUCTURE

Infrastructure-focused intelligent transport systems are embedded within the transport network, and include equipment such as dynamic signage, traffic lights and in-road sensing devices. They help to ensure the availability and quality of the transport infrastructure, and can be used to manage traffic flow, enable payments for network use, and detect incidents and hazardous weather conditions.

For example, electronic tolling involving automatic number plate recognition is already in use on the Northern Gateway Toll Road. Electronic tolling saves time and congestion because vehicles don't have to stop at toll booths.

INTELLIGENT TRANSPORT SYSTEMS AND VEHICLES

Vehicle-installed intelligent transport systems enable them to respond to driving conditions without driver input or control. These solutions cover everything from cruise control to autonomous (or driverless) vehicles, with benefits ranging from increased safety to convenience and fuel and journey efficiencies.

For example, intelligent transport systems in some vehicles use radar and lasers to detect if a collision is likely to happen. They can alert the driver, pre-tension seatbelts and apply the brakes automatically if they determine that a collision is otherwise unavoidable.

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[1] tbc

INTELLIGENT TRANSPORT SYSTEMS AND USERS

Intelligent transport systems for users employ technology (such as smartphones and GPS-enabled devices) to improve convenience and journey efficiency for drivers and other users. They can reduce the barriers to switching transport modes and provide real-time and forecast information.

For example, smartphone apps are available that use GPS and 3D maps to work out how efficiently a motorist is driving and provide advice on improving that efficiency.

INTELLIGENT TRANSPORT SYSTEMS AND INDUSTRY

Industry-focused intelligent transport systems aim to reduce costs and/or maximise profits for businesses and industries that operate vehicles.

For example, in-vehicle telematics that provides vehicle weight, speed, position on the network, etc to support total fleet management systems.

COOPERATIVE INTELLIGENT TRANSPORT SYSTEMS

Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) intelligent transport systems use wireless networks to enable secure, real-time interactions between compatible vehicles and between vehicles and the network infrastructure. These solutions are also known as cooperative intelligent transport systems (also referred to as C-ITS).

For example, intelligent transport systems technologies can provide real-time or near real-time information, collected by sensors, to transport users, covering everything from traffic conditions and weather conditions to expected arrival times for public transport services and whether the services cater for wheelchair users.

INTELLIGENT TRANSPORT SYSTEMS AND BACK-OFFICE SYSTEMS

Intelligent transport systems-enabled back-office solutions support traffic management and long-term investment decisions. They collect, aggregate and store data about the state and use of the network, for use in real-time operations as well as planning and investment.

For example, the Auckland Joint Transport Operations Centre (JTOC, operated in partnership with Auckland Transport) enables network operators to adjust traffic light signals, variable speed and message signs, and ramp metering in response to real-time traffic conditions monitored through cameras and other sensors.

Note that while these six categories are useful in considering our investment and roles in relation to intelligent transport systems, they don't operate in strict isolation; they work together to deliver a whole that's much greater than the sum of its parts.

THE WHOLE IS GREATER THAN THE SUM OF ITS PARTS

HOW DO INTELLIGENT TRANSPORT SYSTEMS HELP US CREATE TRANSPORT SOLUTIONS FOR A THRIVING NZ

The Transport Agency's 2013-16 *Statement of intent* sets out our medium and long-term objectives. It aims to ensure that New Zealand's transport activities are appropriately planned, invested in and regulated to support the country's economic growth, productivity and social wellbeing.

The *Statement of intent* provides a framework for our investment in intelligent transport systems, with a focus on achieving 12 medium-term (2013-22) objectives that will be implemented through a 10-year work programme. Together, these **12 objectives** aim to help us meet our four long-term goals:

INTELLIGENT TRANSPORT SYSTEMS' CONTRIBUTION TO OUR 12 OBJECTIVES

Integrate one network for customers

Integrate planning, investment and operations so that travel around our towns, cities and rural areas is seamless and more efficient – whether by walking, cycling, using public transport, freight vehicles or cars.

Shape smart transport choices

Help to shape the transport choices that people make by providing good information and encouraging them to travel safely and efficiently. We want to work cooperatively with other network operators to unlock the land transport system's contribution to a thriving New Zealand.

OBJECTIVE 1: INTEGRATE LAND USES AND TRANSPORT NETWORKS TO SHAPE DEMAND AT NATIONAL, REGIONAL AND LOCAL LEVELS

Intelligent transport systems contribute to this objective by enabling:

- significant improvements in the quality and completeness of travel demand information, for land use and transport modelling
- the development and adoption of more efficient and targeted pricing mechanisms (such as for tolling)
- more 'joined-up' investment planning (national, regional and local).

OBJECTIVE 2: INTEGRATE NATIONAL AND LOCAL TRANSPORT NETWORKS TO SUPPORT STRATEGIC CONNECTIONS AND TRAVEL CHOICE

Intelligent transport systems contribute to this objective by enabling:

- significant improvements in the quality of information about network use
- more targeted and accurate investments in transport networks
- the better management and use of existing networks in urban centres (A)
- a greater integration of information flows between the Transport Agency and road-controlling authorities in the spirit of 'one network for customers'.

OBJECTIVE 3: IMPROVE FREIGHT SUPPLY CHAIN EFFICIENCY

Intelligent transport systems contribute to this objective by:

- enabling significant improvements in the quality and completeness of information about freight use of the network (B)
- reducing operator risk by enabling better network management on key freight routes and in urban areas around ports, industrial areas and freight hubs
- improving transport and network operators' knowledge of journey times, investment options and commercial risks.

OBJECTIVE 4: IMPLEMENT THE SAFE SYSTEM APPROACH ACROSS THE LAND TRANSPORT SYSTEM TO ACCOMMODATE HUMAN ERROR AND VULNERABILITY

Intelligent transport systems contribute to this objective by:

- improving vehicles' ability to avoid collisions with other vehicles, static objects and pedestrians and better protect occupants in the event of a crash
- improving drivers' ability to comply with speed limits and respond to advisories and other network indicators (C)
- increasing the quality of information available about collisions and near misses
- (potentially in the long term) enabling lower levels of investment in making roads safer.

OBJECTIVE 5: INCENTIVISE AND SHAPE SMART TRAVEL CHOICES USING A CUSTOMER-FOCUSED APPROACH

Intelligent transport systems contribute to this objective by:

- enabling real-time, two-way communication with and between customers to improve their travel choices (D)
- improving the quality and timeliness of information being shared with customers
- enabling new revenue approaches that increase options available to travellers.

OBJECTIVE 6: REDUCE COSTS FOR TRANSPORT USERS THROUGH BETTER REGULATION AND WILLING COMPLIANCE

The key intelligent transport systems contributions and measures that contribute to this objective are included under objectives 2, 3, 4, 5, 8 and 12.

THESE
12 OBJECTIVES
AIM TO HELP US
MEET OUR FOUR
LONG-TERM
GOALS

Deliver highway solutions for customers

Ensure that the state highway network plays its part in the wider transport network and contributes to safe and reliable journeys. Over time we want to improve the experiences that people have on our highways, and work to ensure the state highway network is resilient to change.

Maximise returns for New Zealand

Make smart and innovative investments in the national, regional and local land transport system because we need to ensure that every dollar we spend helps New Zealand thrive. Together with our partners we allocate funds to advance national and regional transport objectives.

OBJECTIVE 7: GREATER RESILIENCE OF THE STATE HIGHWAY NETWORK

Intelligent transport systems contribute to this objective by:

- increasing the quality of network resilience and demand information available to those tasked with managing disruptions to the network
- increasing the quality of information available to travellers, enabling them to make smart real-time travel decisions and minimising the impacts of network constraints on them and their fellow travellers.

OBJECTIVE 8: DELIVER CONSISTENT LEVELS OF CUSTOMER SERVICE THAT MEET CURRENT EXPECTATIONS AND ANTICIPATE FUTURE DEMAND

Intelligent transport systems contribute to this objective by enabling:

- more effective incident management, minimising impacts on the network and improving traffic movements
- better speed information and enforcement interventions to promote compliance with 'safe speed' limits and advisories
- better quality information about roadside noise, which can be used to identify accurately the location, size and nature of any compliance issues.

OBJECTIVE 9: PLAN FOR AND DELIVER THE ROADS OF NATIONAL SIGNIFICANCE

The intelligent transport systems contributions to this objective are included under objectives 1, 2, 7, 8 and 11.

OBJECTIVE 10: ALIGN INVESTMENT TO AGREED NATIONAL, REGIONAL AND LOCAL OUTCOMES AND IMPROVE VALUE FOR MONEY IN ALL WE INVEST IN AND DELIVER

The intelligent transport systems contributions to this objective are included under objectives 1, 2, 3, 7, 8, 9, 11 and 12.

OBJECTIVE 11: ENSURE EFFECTIVE AND EFFICIENT CO-INVESTMENT WITH OUR PARTNERS

Intelligent transport systems contribute to this objective by:

- increasing the likelihood of 'joined-up', cross-sector investment decisions owing to a pool of shared quality information
- supporting more efficient road and roadside investments through more accurate network information (E)
- enabling a more effective road policing investment through more accurate network and compliance information.

OBJECTIVE 12: INFLUENCE FOR INNOVATIVE REVENUE, PRICING AND FINANCING APPROACHES THAT ENHANCE THE VALUE DELIVERED BY LAND TRANSPORT INVESTMENTS

Intelligent transport systems contribute to this objective by enabling:

- new traveller payment mechanisms
- new charging regimes that reflect mode, route, lane and time of travel choices.

(A) Making the most of urban network capacity

(B) Moving more frieght on fewer trucks

(C) Safe speeds to reduce deaths and injuries

(D) Putting customers at heart of our business

(E) Efficient road maintenance investment and delivery

WHAT ARE THE BENEFITS?

INVESTMENT HERE

YIELDS THESE BENEFITS

Provides evidences for

Better planning and investment decisions

Better benefits realisation

GPS location data aggregated into traffic flow

Informs

Improved realtime traffic operational decisions

Reduced operating costs

Enables

New retail information services for the traveller

Better journey planning (customer)

FIGURE 4: An example intelligent transport systems solution and the multiple benefits it makes possible

HOW DO INTELLIGENT TRANSPORT SYSTEMS BENEFIT NEW ZEALAND'S TRANSPORT SECTOR?

While technology is already used to deliver a number of significant transport sector benefits, making more effective use of intelligent transport systems could take it to the next level – enabling dramatic improvements in:

- the way we gather and use data on traffic flows and the state of the network
- the amount and quality of that data
- our ability to respond to operational issues in the transport network
- the way we make decisions about, invest in and operate the network at local, regional and national levels
- the way we manage the risks and costs of network ownership and control
- travellers' access to the real-time information they need to plan and complete their journeys.

With so many different functions and groups benefiting, it's no wonder that the Transport Agency has identified intelligent transport systems as a priority area.

KEY BENEFIT: MORE INTEGRATED NETWORK FOR CUSTOMERS

In the near future, intelligent transport systems will enable us to use information gathered via travellers' smartphones and other GPS-compatible devices to get an accurate, constant stream of information about the use of local, regional and national transport networks. And with the number of smartphone-carrying travellers likely to increase – leading to greater accuracy and coverage – it won't be long before intelligent transport systems-driven information services can clearly differentiate between vehicle types and modes, and be trusted to inform and enable real-time network management.

This type of information-gathering is already in action in cities around the world, and people are using it to make real-time journey decisions.

Improvements in how we capture data – matched with enhanced privacy protections – will lead to improvements in the quality and depth of the information available to network investors, operators and users. Add to that better technologies and standards for road equipment (such as signs, gantries and sensors), and we'll also have more useful information about the state of the network itself.

KEY BENEFIT: **BETTER WAYS TO GET INFORMATION TO TRAVELLERS**

Intelligent transport systems will provide more effective ways of getting information to travellers, when and where they need it. For example, information on network conditions, speed restrictions, crashes and alternative routes can be sent to travellers via:

- dashboard displays in their vehicles (internet connections are already offered as standard by many manufacturers)
- smartphones and smartphone apps, which are easily upgraded with the latest services – more so than vehicle-bound technologies.

Improvements in the way we get information to travellers should improve the way people respond to 'active network management' interventions, such as travel advisories, adjustments to traffic light signals, variable speed and message signs, and ramp metering, which are used to manage traffic conditions monitored through cameras and other sensors.

KEY BENEFIT: **ENHANCED VEHICLE SAFETY**

Vehicle technology is already being used to provide drivers with early warning of trouble, and even to take automatic corrective actions on the driver's behalf. In time it will deliver a safer travelling experience, as it will become progressively harder for drivers in such vehicles to hit things – such as other vehicles, cyclists, pedestrians or barriers.

Intelligent transport systems technology could also be used to:

- increase compliance, with drivers able to let their vehicles respond automatically to speed restrictions, traffic light changes and lane restrictions
- enable V2V and V2I interactions, in which intelligent transport systems-empowered vehicles 'talk' to one another in traffic, thus avoiding collisions in busy environments. Some vehicles will be able to interact directly with roadside infrastructure such as traffic signals, possibly allowing drivers to affect the sequence themselves.

KEY BENEFIT: **MORE EFFICIENT JOURNEYS (ENABLING INCREASED PRODUCTIVITY)**

In future, intelligent transport systems technologies could benefit fleet operators and others using the network by:

- adjusting vehicle speeds to minimise braking, maximise fuel efficiency and reduce vehicle wear and tear
- enabling travellers to choose the most efficient routes and modes to minimise the impacts of network constraints
- allowing drivers to manipulate network assets to their advantage (as long as it doesn't inconvenience other users).

Meanwhile, the Transport Agency will benefit through more effective and longer-lasting assets, reduced costs of ownership and more effective traffic management services.

KEY BENEFIT: **INNOVATIVE PAYMENT, PRICING AND COMPLIANCE APPROACHES**

Intelligent transport systems offer new opportunities to improve customer service. Including more personalised payment options and potentially innovative pricing mechanisms. Intelligent transport systems also provide new ways of encouraging using compliance and help target enforcement (potentially automatically) when required.

MAKING MORE EFFECTIVE USE OF INTELLIGENT TRANSPORT SYSTEMS COULD TAKE IT TO THE NEXT LEVEL – ENABLING DRAMATIC IMPROVEMENTS

OUR APPROACH

WHAT ARE WE DOING ALREADY IN THE INTELLIGENT TRANSPORT SYSTEMS SPHERE?

We've already made significant investments in intelligent transport systems over a number of years. For example we've:

- installed sensor technologies in roads and integrated them with roadside infrastructure to gather information about traffic volumes and flows
- provided roadside and web-based journey information, including estimated journey time, speed and weather advisories
- installed joint traffic operations centres that allow us to see in real-time what's happening on the network and adjust settings remotely in response to traffic and changing conditions, eg. variable speeds and ramp signals in Auckland
- introduced electronic road user charging and electronic log books
- installed systems that automatically recognise number plates to support free-flow toll roads.

OUR APPROACH

Over the past year the Transport Agency has been developing an intelligent transport systems framework that maps the benefits of possible intelligent transport systems to our strategic goals, objectives and priorities to identify key intelligent transport systems interventions, roles and investment opportunities over the next decade.

ASSUMPTIONS BEHIND OUR APPROACH

In developing our approach to assessing the benefits and opportunities of intelligent transport systems – and therefore the best areas in which to invest – we've made a number of assumptions:

- Pressure on our urban networks will increase over the next 25 years, with a rising aggregate demand for travel and greater personalisation, and a requirement for us to get more out of the existing network while minimising the costs.
- An unforeseen technological game changer will not emerge in the next decade and render our investment decisions moot.
- There's no such thing as an acceptable level of road death or serious injury.
- While it's highly desirable to introduce common standards for certain aspects of intelligent transport systems, it's unlikely that these will be retrofitted to existing investments – so we'll need to accommodate diversity in the short to medium term.
- Privacy concerns won't significantly impede progress towards realising some intelligent transport systems benefits, especially those that depend on knowing a traveller's or a vehicle's immediate location.
- Having to compete with other initiatives for limited resources will not unduly limit investment in intelligent transport systems.

These issues introduce a number of risks. For example, New Zealand's transport sector might invest in outmoded solutions, incur additional costs if we adopt early-generation technologies too soon, or end up with overlapping and incompatible solutions, potentially responding to the same challenge.

THE PRINCIPLES OF OUR APPROACH

Our approach and role in relation to intelligent transport systems are based on six key principles. These guide all our intelligent transport systems-related operational and investment decisions.

1 We invest in and support intelligent transport systems solutions that demonstrably contribute to our strategic objectives (for more about these, see page 10). This enables us to focus our limited resources where they'll add most value.

2 We prefer a traveller-centric (rather than mode or road) approach, with customers at the heart of our business.

3 We consider intelligent transport systems from multi-modal perspectives, integrating information and customer experience across modes.

4 We encourage sector-led intelligent transport systems development and investment. This prevents us unnecessarily investing in or overregulating technologies, unless the investment is in an asset for which we're accountable.

5 We're solution neutral and prefer to be a service provider of last resort.

6 We value traveller choice over administrative convenience.

WHAT THIS MEANS FOR OUR BUSINESS

If we're to use intelligent transport systems to help achieve our 12 medium-term objectives, we need to understand our business requirements and how we can use intelligent transport systems to better meet them. Not every development will be found practical or appropriate to New Zealand, and some technologies essentially compete for the same requirement. Choices will have to be made.

The following table lists those business requirements that are particularly dependent on intelligent transport systems solutions, and summarises our current vision for how we see intelligent transport systems supporting them – both now, and in the future.

ITS OFFERS BETTER WAYS OF MEETING THE FOLLOWING REQUIREMENTS

BUSINESS NEED	REQUIREMENTS (INDICATIVE)
We need information about traveller and vehicle movements • Real time • Historic	• What choices are travellers making (route and mode)? • Vehicle volumes (route and lane occupancy) by vehicle type
We need to share information that helps • Travellers • New Zealanders	• Inform travellers about unplanned/planned network events • Help travellers plan trips (which mode, route, cost, time, safety) • Help users comply to variable advisories • Help New Zealanders decide where to locate a business or live
We need know the state of road-side assets - and control them remotely	• We wish to know about the current state/settings of the road-side asset, and to know about failures as they occur • We want to configure road-side assets remotely (directions, variable speed and advisory messages, traffic signal sequences)
We need to maximise journey efficiency	• Help travellers minimise trip time • Maximise trip time reliability • Help travellers minimise cost (fees, fines, operating costs)
We need to identify vehicles	• We need to charge travellers fairly and conveniently (to them and other users) • We need to provide tailored information (eg licence renewals, cost implications) • Infringements
We need to reduce the instance and severity of crashes	• Help reduce the severity and instances of crashes • Help users maintain appropriate following distances and stay in-lane • Help users comply with speed limits and other advisories

HOW WE SOLVE THEM NOW... AND IN THE FUTURE

CURRENTLY WE HAVE	MOVING TO
• No travellers movement information • We aggregate information manually • Multiple sources using different capture approaches (coil, bluetooth, etc)	• Move to single external crowd sourced services (traveller and vehicle information) • Consolidate approach on GPS location data based solutions
• Inconsistent service approach - (national vs regional, wholesale vs retail) • Information is specific to mode and channel	• Consistent approach and quality nationally. Services are mode and channel agnostic • Using common shared information source (see above) • The Transport Agency will have confirmed its role for retail information provision
• Few common sector or vendor standards means complexity and higher costs • Proprietary approaches (regionally, vendor) results in more complexity and inflexible systems	• Standards in place and adopted • Single configurable network management and tunnel systems, shared by all regions
• Poor crisis-mode synchronisation and variable info quality • Poor freight efficiency support	• In-cab fuel efficiency technology • Freight operators to interact with network systems to maximise trip efficiency
• Mostly manual licence plate reading, either by person of using remote camera • Limited automatic plate reading	• Fully automated identification of vehicles • Automatic licence plate reading (medium term) • Vehicle identified by chip/sensor (long term)
• New models already have sensor/avoidance capability - regulatory side has yet to catch up • Few standards in place - proprietary approaches by manufacturer	• Increasing autonomous technology • Supporting communication solutions in place for V2V opportunities • Standards and regulatory mechanisms in place

Many of these opportunities will require direct investment to realise – while some will be achieved via regulation and risk management (Transport Agency's possible roles are explored later in this document). Because of their high potential: new ways to capture data about traveller movements, autonomous vehicles and new ways to locate and identify vehicles are singled out below for discussion.

The ubiquity of smart phones (and real time GPS location data for travellers) opens the door to improved methods of understanding real-time traffic flow. This will need to be proven of course, and raises questions as to who might run a service to mesh all the data. Such an advance may transform real-time traffic management and allow us to invest more discretely in other methods such as Bluetooth and expensive coils.

Increasingly autonomous vehicles using sensors, vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and other technologies to manage the driving task appear to offer great potential in terms of safety and productivity. While such technologies are still in development there seems to be a strong case for encouraging the adoption of vehicles with these technologies as soon as possible. It is currently unclear what combination of sensor-based and communication-based autonomous vehicle features will ultimately prove to be successful. We will continue to monitor autonomous vehicle developments with great interest.

The last of the three strategic advances is in the area of vehicle identification. Here there is much more work to be done to identify the best way forward. Some form of on board 'chip' and roadside sensors may allow a more convenient approach over video based systems. However, privacy concerns and discussions on how best to pay for the land transport network means there is a lot more work to do in this area.

WE ARE CONTINUING TO EXPLORE HOW WE CAN BEST USE INTELLIGENT TRANSPORT SYSTEMS TO MEET OUR BUSINESS REQUIREMENTS

WHAT'S OUR ROLE AS AN INTELLIGENT TRANSPORT SYSTEMS PARTICIPANT?

The Transport Agency could take a wide range of roles in the intelligent transport systems space – from being a follower to taking the investment lead. While each role is unique, they are closely interlinked, so, for example, a regulator is also a facilitator, influencer and follower.

Here's a brief description of six key roles we could undertake. We expect to develop a more comprehensive understanding of these roles in partnership with the sector and other government agencies.

INVESTMENT LEAD	PLANNING AND INVESTMENT PARTNER	REGULATOR	FACILITATOR	INFLUENCER	FOLLOWER (REACTIVE)
Main provider of the investment needed to make the benefits of intelligent transport systems a reality. May choose to invest directly, or indirectly with or through others	Invests in intelligent transport systems-related asset to make their benefits a reality. Not the lead investor	Sets standards and governance mechanisms to hold the sector to account for compliance	Steps in proactively to facilitate sector alignment. Has no formal governance authority, but informally adopts the leadership role to deliver the best possible mix and benefits of intelligent transport systems technologies	Proactively influences sector practice and behaviour to deliver the best possible mix and benefits of intelligent transport systems	Stays informed of progress and developments – reacts to market.
Example Active network management	*Example Network data*	*Example Advanced vehicle safety systems*	*Example Greater use of in-vehicle telematics, active fleet management and self-monitoring by freight operators*	*Example Traveller information applications*	*Example Smart phone developments*

THE TRANSPORT AGENCY AS INFLUENCER, FACILITATOR AND REGULATOR

Our role as an influencer, facilitator or regulator in the transport sector will be determined by the market's response to a given technology (its uptake and stage of development), assumptions about public and private sector roles, and business model decisions.

By way of example, here are three intelligent transport systems in which we could have a role as influencer, facilitator or regulator (with minimal direct investment):

INTELLIGENT TRANSPORT SYSTEMS INTERVENTION	PRIMARY ROLE	SECONDARY ROLE
Mechanisms to get more useful information to travellers and freight operators	Vehicle and cooperative regulator; user and industry-related facilitator	Infrastructure and cooperative-related investment lead and partner Data-related (back office) investment lead Facilitator retail information to market, and regulator of market information quality
Quality information on the real-time (and historical) movements of travellers and vehicles	Facilitator and regulator of new wholesale information service Encouraging new market opportunity and ensuring information quality to consumers (and to ourselves)	Infrastructure-related investment lead and partner Data-related (back office) investment to point systems to new data source
Advanced vehicle safety features to reduce the incidence and severity of crashes	Vehicle and cooperative-related regulator	Infrastructure and cooperative-related investment lead and partner Data related (back office)

THE TRANSPORT AGENCY AS INVESTOR AND PLANNING PARTNER

As above, our role as an investment lead or partner will be determined by the market's response to a given technology (its uptake and stage of development), assumptions about public and private sector roles, and business model decisions.

Three intelligent transport systems in which we could have a role as investor are:

INTELLIGENT TRANSPORT SYSTEMS INTERVENTION	PRIMARY ROLE	SECONDARY ROLE
More active network management and speed advisories	Infrastructure-related investment lead and planning partner Data-related (back office) investment lead and partner	Sector regulator and facilitator – developing incentives for cross-mode services to join up
Quality information about the state of the network (not the flow upon it)	Infrastructure-related investment lead and partner Data-related (back office) investment lead and partner	Vehicle and cooperative regulator; user and industry-related facilitator
The ability to identify a vehicle accurately for regulatory or payment reasons	Infrastructure-related investment lead and partner Data-related (back office) investment lead	Vehicle and cooperative regulator

WE NEED TO BE AGILE AND FLEXIBLE TO RESPOND TO CHANGING TECHNOLOGIES AND OPPORTUNITIES

WHERE CAN WE HAVE THE MOST IMPACT?

Our commitment to realising the full potential of intelligent transport systems as technological solutions requires us to invest in a range of intelligent transport systems initiatives – whether we're taking the lead, influencing market behaviour or funding interventions ourselves.

Our approach will be the same as that taken for any other transport investment; the interventions must meet our criteria for strategic fit, effectiveness and efficiency to maximise returns for New Zealand.

FIVE KEY INVESTMENT AREAS

We've identified five intelligent transport systems-related investment areas that we believe could make the greatest contribution to achieving our medium-term objectives.

These have been identified through an assessment of the potential benefits of intelligent transport systems, taking into account our likely overall level of investment and the expected impacts of intelligent transport systems in achieving our objectives over 10 years. Strong benefits with relatively low levels of investment scored well.

INTEGRATED NETWORKS FOR CUSTOMERS

Mechanisms for collecting quality data about the use of the network

Better-quality data to drive better operations, planning and investment

More active network management

SMARTER TRANSPORT CHOICES

Mechanisms that enable the delivery of accurate information to travellers to promote smarter transport choices

SAFER SPEEDS AND SAFER VEHICLES

Real-time safe speed messaging to drivers and/or vehicles
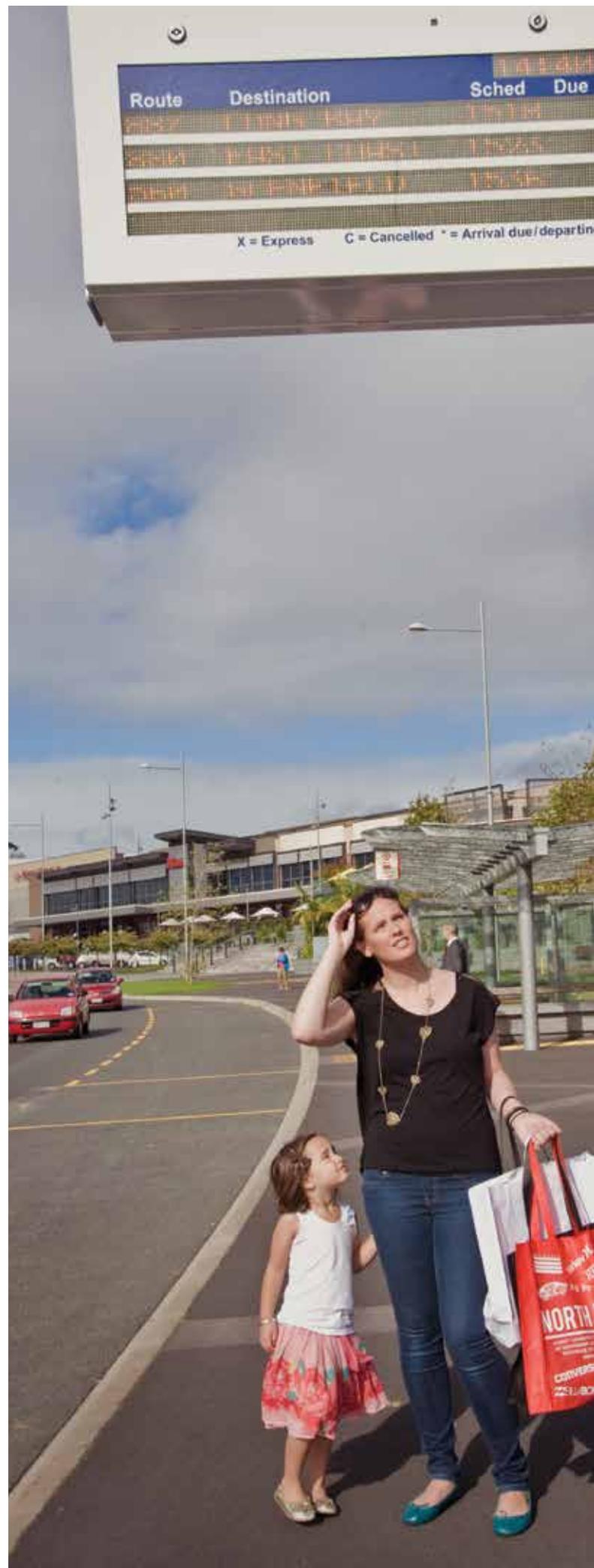
Increasingly active vehicle safety features

IMPROVED FREIGHT SUPPLY CHAIN EFFICIENCY

Better and more freight network data collection and use for enhanced network management and more efficient freight movements

INNOVATIVE PAYMENT, PRICING AND COMPLIANCE APPROACHES

Mechanisms that enable new payment, pricing and compliance options

Note that specific intelligent transport system benefits will be influenced by evolving technologies and market demands. We'll continually monitor the global transport sector to ensure that our intelligent transport systems' efforts and investment practices are maximising returns for New Zealand.

KEY ACTIONS: 2014–18

In the next five years we plan to work with the wider transport sector to develop a shared approach to intelligent transport systems and their implementation in New Zealand.

Our work will focus on five key areas:

1

Strengthening the sector - leading, facilitating and maintaining a sector-wide consensus on the use of intelligent transport systems in New Zealand. Including capacity building and supporting the Ministry of Transport's policy work.

2

Improving transport information services - promoting and developing integrated information services for travellers, network operators and transport information users. Including work on privacy and security.

3

Improving active network management - better network information and more dynamic network control. Including improving the functionality of network control centres and developing a national land transport geospatial dataset.

4

Advancing transport safety and efficiency - enabling the faster adoption of advanced vehicle safety features. Including improving speed advisories and automated enforcement options.

5

Enabling innovative customer services - providing better payment, pricing and compliance options. Includes investigating new ways of identifying vehicles.

See **[website]** for a list of our key actions. This includes actions from the Intelligent Transport Systems Action Plan 2014-18.

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If you have further queries, call our contact centre on 0800 699 000 or write to us:

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This publication is also available on NZ Transport Agency's website at
www.nzta.govt.nz