Intelligent Transport Systems
Master Plan

Discussion Paper
February 2014
Contents

1. Introducing Intelligent Transport Systems ................................................................. 2
2. Introducing the Master Plan and Discussion Paper .................................................. 3
   2.1 ITS Master Plan ......................................................................................................... 3
   2.2 Discussion Paper ...................................................................................................... 3
3. What is the strategic context for investing in ITS? ...................................................... 4
   3.1 Main Roads 2020 Strategy ...................................................................................... 4
   3.2 Moving People Network Plan .................................................................................. 5
   3.3 Towards Zero Road Safety Strategy ........................................................................ 5
   3.4 Strategic Context Summary ..................................................................................... 6
4. What has Main Roads Western Australia done already? ............................................. 7
   4.1 Foundation ITS Implementation and New Traffic Management Control System .... 7
   4.2 Adaptive Traffic Signals ......................................................................................... 9
   4.3 Electronic Speed Limit Signs at Schools and Shopping Centres ............................ 10
   4.4 Kimberley Flood Warning Signs ........................................................................... 11
   4.5 Real Time Traveller Information at Roadwork Sites .............................................. 11
   4.6 Intelligent Speed Assist ......................................................................................... 12
5. What else has happened in Australia? ...................................................................... 14
   5.1 Intelligent Access Program .................................................................................... 14
   5.2 Electronic Stability Control .................................................................................... 15
   5.3 Right Move Perth .................................................................................................... 16
   5.4 Australian Approach to Cooperative ITS ............................................................ 17
   5.5 International Trends in ITS .................................................................................... 18
6. Australian National ITS Architecture ....................................................................... 19
7. Next steps in developing the ITS Master Plan ........................................................... 21
   Feedback and Questions .............................................................................................. 21
Appendix A: Preliminary Investment Logic Map ............................................................... 22
1. Introducing Intelligent Transport Systems

Intelligent Transport Systems (ITS) have been in use on Western Australian roads since the introduction of traffic lights. Many people would be unaware of the electronics buried under the bitumen on many of our roads, or in grey boxes at intersections, which help monitor and manage traffic flows remotely through the control of traffic signals, and can be regarded as the first generation of ITS. Similarly, many people would be surprised at how long technology has been improving and informing their rail and bus travel.

Main Roads’ investment in ITS means that on key arterial roads, peak traffic flows are controlled remotely with adjustments to the length of time given to green lights, the Traffic Operations Centre (TOC) in Northbridge is kept aware of traffic conditions and has access to extensive CCTV cameras. In some remote areas, signs can be activated remotely from Perth to close roads if floods are detected.

ITS is not only a government initiative; technology devices such as Global Positioning Systems (GPS), wireless and mobile phone technologies have been used to monitor the movements of trains, ships and aircraft for some time, and now these systems are being harnessed by the road transport sector to improve efficiency and safety.

ITS components can be grouped into three areas:

- **Intelligent Infrastructure**: such as traffic signals on roads, variable messaging signs to alert road users of hazards ahead and freeway ramp signals that work to keep freeways flowing
- **Smart Vehicles**: such as automatic crash notification, intelligent speed assist, intelligent cruise control, reverse and forward collision warning, GPS navigational systems, and alcohol ignition interlocks
- **Information Services**: such as next-bus information on your mobile phone, in-car navigation systems receiving current traffic conditions to guide you around congestion hotspots, and the national Intelligent Access Program for trucks.

Sitting underneath these ITS applications, communication and control systems are an essential **foundation** for ITS and can be the most critical, complicated and expensive component. The diagram below shows that communications technologies are an important part of connecting intelligent infrastructure, smart vehicles, information services and informed transport users.

![Figure 1.1 ITS includes Intelligent Infrastructure, Smarter Vehicles and Information Services to improve transport outcomes for Informed Transport Users (source: VicRoads iTransport)](image-url)
2. Introducing the Master Plan and Discussion Paper

2.1 ITS Master Plan

Main Roads is preparing an ITS Master Plan as part of our 2020 Strategy; this Discussion Paper is the first step in preparing that Master Plan. The Discussion Paper seeks to start the engagement with both internal and external stakeholders and to lead into collaborative discussion sessions.

Austroads’ 2013 review\(^1\) of international ITS procurement best practice found that the benefits of an ITS Master Plan are strongest in reducing risk and improving efficiency of ITS implementation and operation and that the benefit has strengthened over time in line with increases in the interdependence of technology elements.

2.2 Discussion Paper

ITS is a tool for achieving transport outcomes, and one that works across a number of objective areas (mobility, safety, environmental, etc). Austroads recommends that a well-focussed ITS Master Plan should identify how to manage and integrate technologies in an environment where the selection and development of initiatives that include ITS is often driven from outside the Master Plan\(^2\). These external imperatives result from transport strategies, action plans and projects where ITS plays a key role in achieving outcomes as well as from external market dynamics and evolving technologies.

To capture the environment in which this ITS Master Plan is being developed and to provide internal and external stakeholders with some opportunities, challenges and issues for consideration, the Discussion Paper sets out the following:

- The strategic context for investing in ITS,
- Some examples for ITS in Western Australia, and
- The impact of an Australian National ITS Architecture.

This Discussion Paper does not seek to establish Main Roads’ targets for mitigating the effects of congestion or reducing fatalities and serious injuries, but rather to identify the existing strategic context and how ITS can best contribute. Nevertheless, the growing capabilities of technology can and should inform objective setting across the transport portfolio and this is one reason for involving portfolio agencies in the development of the ITS Master Plan. Not only can portfolio stakeholders contribute valuable insights to shape how ITS can best be used at Main Roads, but also gain access to the possibilities that ITS offers to achieve transport objectives.

A focus paper has been developed as a companion to this Discussion Paper. This focus paper covers the international trends in ITS and how these might affect Main Roads activities into the future.

Finally, this Discussion Paper looks does not cover Main Roads capability to manage ITS throughout the life cycle nor Main Roads’ other strengths and weaknesses related to ITS. These topics will be addressed as part of the stakeholder workshops.

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\(^1\) Austroads Research Report AP-R448-14 *Procurement of ITS (International Practice)*

\(^2\) Somers, A & George, A 2010, ‘Operational performance targets for freeways and arterial roads and the impact on project scope and design’, AITPM 2010 National Conference, Brisbane
3. What is the strategic context for investing in ITS?

Western Australia is facing significant challenges in the transport domain, to maintain and improve mobility in our growing city and state and to continually improve safety for our transport users. The Government of Western Australia and its transport portfolio agencies have prepared strategic plans to respond to those challenges. ITS will assist Main Roads and the transport portfolio to respond to those transport challenges. The following sections establish the strategic context for ITS in Western Australia.

3.1 Main Roads 2020 Strategy

During 2012 and 2013, Main Roads developed a 2020 Strategy to describe the strategic direction that Main Roads will take over the following eight years. The vision of the 2020 Strategy is for **smart roads, safe journeys**. There are five areas of focus in the 2020 Strategy:

- Creating value
- Making technology work for the community
- Enhancing travel wellbeing
- Ensuring future capability, and
- Building strategic value

Technology will assist Main Roads to deliver upon all five focus areas; however, it is the area of **making technology work for the community** that drives this ITS Master Plan. In this area, the 2020 Strategy requires Main Roads to optimise transport outcomes for the community through the best use of available and emerging technology. The 2020 Strategy sets out a number of Success Factors, Actions and Initiatives within this focus area.

**Success Factors**

- Minimised Whole of Life Cycle costs
- Optimise road network performance through the use of ITS services and tools consistent with DoT transport strategies and plans

**Actions**

- Invest in continual improvement for Best Practice Road Technology
- Optimise the performance of existing road assets and meet future transport needs through the application of Intelligent Transport Systems
- Establish a sustainable, secure and responsive Information Communication & Technology (ICT) Infrastructure capable of supporting the dynamic nature of our operations now and into the future
- Ensure agility, integration and timeliness in adopting new technology

**Initiatives**

- Implement an evidence based framework that supports a robust Whole of Life Cycle Cost
- **Develop the ITS Master Plan consistent with National ITS Architecture**
- Implement an ICT Strategy and Plan to upgrade the agency infrastructure and applications
- Implement a funded research and development program
3.2 Moving People Network Plan

The Department of Transport has prepared a draft Moving People Network Plan (MPNP) to set out of the management of the metropolitan transport network over the coming decades. The MPNP identifies a key role for ITS across a number of outcome areas for the safety and mobility benefits that it can provide.

The role of Intelligent Transport Systems in the Moving People Network Plan:

The transport challenges in meeting forecast growth cannot solely be addressed by traditional measures. By harnessing innovative technologies in the form of Intelligent Transport Systems (ITS), new solutions can be developed in response to these challenges. Such systems have been widely accepted by the public and private sectors worldwide as the way forward in achieving the goal of sustainable mobility while at the same time improving quality of life.

Well designed and deployed ITS can enhance the safety, efficiency and reliability of travel, reduce or delay the need for costly investment in new infrastructure and deliver improved productivity for the existing transport network. ITS can help improve the connectivity and accessibility of the network for its users. In relation to the goals of the MPNP, ITS can be deployed in Western Australia to:

- improve road safety and compliance in alignment with the Austroads ‘safe systems’ approach and the Towards Zero – Road Safety Strategy to Reduce Road Trauma in Western Australia 2008-2020 by helping to prevent crashes and minimise harm when crashes occur;
- support road network operations through proactive monitoring and control of traffic flows to achieve optimal travel conditions, as well as through rapid detection and response to incidents and congestion to minimise disruption to road users;
- facilitate movement of people and goods by providing priority access for high-occupancy or high value transport modes such as public transport and freight;
- improve the provision and variety of real-time traveller information services to enable informed travel choices and support road agencies in managing traffic demand; and
- improve cross-agency collaborative working practices, data exchange and shared facilities to enable delivery of integrated multi-modal transport services and end-to-end journey planning.

Importantly, ITS are key enablers in delivering optimal road network performance and road-user orientated services.

3.3 Towards Zero Road Safety Strategy

Western Australia’s Towards Zero Road Safety Strategy incorporates the Safe System, which aims to improve road safety through four cornerstones:

- Safe Road Use
- Safe Roads and Roadsides
- Safe Speeds, and
- Safe Vehicles

ITS can assist road safety in each of the four areas of the safe system. The strategy was formally endorsed in 2009, and at that time identified that technology was likely to in future make a significant contribution to improving road safety.
In the period since the publication of Towards Zero, the principles of the safe system continue to guide road safety in Western Australia and the ability of technology to support this safe system has further improved. This ITS Master Plan must therefore look to support the safe system approach through well targeted use of technology, including the necessary enabling actions for technologies deployed by others such as smarter vehicles.

### 3.4 Strategic Context Summary

ITS will have an important role to play right across the activities of Main Roads and the transport portfolio. Although in the 2020 Strategy the ITS Master Plan is linked to making technology work for the community, it can also assist to create value and enhance travel wellbeing. The growing role of ITS makes it an important part of Main Roads current and future capability.

Western Australia is facing some significant transport challenges and ITS will assist in achieving a number of different mobility and safety outcomes. A preliminary Investment Logic Map has been prepared to provide a clear depiction of a possible investment rationale for ITS. This has been included in Appendix A to this Discussion Paper.

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**Figure 3.1 The ITS Master Plan assists to deliver upon transport strategy**
4. What has Main Roads Western Australia done already?

The ITS Master Plan is not the start of the ITS in Western Australia, but rather an opportunity to shape an even stronger future for ITS in Western Australia. This section outlines some of the progress to date in Western Australia to assist us to understand where we need to get to and what we can learn from the journey so far. The examples in this section focus on cases where Main Roads has driven the implementation of ITS.

4.1 Foundation ITS Implementation and New Traffic Management Control System

ITS provide a suite of tools that facilitate modern road network operations by improving customer services with traveller information, incident management, traffic management, demand management and enforcement. The foundation and enabling activities described here are prerequisite to achieving the required ITS services and customer outcomes.

Main Roads’ rollout of foundation ITS includes fibre optic communications to ensure all ITS devices can communicate with the central control system, vehicle detection systems (VDS) to enable collection of network performance data, and closed circuit television (CCTV) coverage to provide the Traffic Operations Centre with vision to better manage incidents.

A funding program to roll this foundation technology out across the road network has been established for a number of years with about 70% of the foundation network now complete. The plan in Figure 4.1 shows the extent of the foundation coverage that is complete and how much is still in the development and / or delivery phase.

In order to manage the existing ITS infrastructure and the future ITS devices and functionality required for new projects such as coordinated ramp signalling and lane use management, Road Network Services Directorate has procured a future-proofed control system that includes a single user interface for operations. A 7-year contract has been established for the supply, implementation and support of a STREAMS, an ITS Control System also used in Queensland, South Australia and Victoria. STREAMS will:

- Control existing and future ITS devices, including, VMS, VDS, CCTV, Electronic Speed Limit Signs, and remote flood warning signs,
- Manage future ITS devices and functionalities such as coordinated ramp signalling and lane use management,
- Interface with existing standalone systems such as SCATS and CCTV Video Management System,
- Provide automated rules-based incident management response plans,
- Send real-time traffic data to external groups including private sector traveller information providers, and
- Integrate with existing systems such as SCATS and IRIS.
Figure 4.1 Foundation ITS as at February 2014; includes fibre, CCTV and VDS, green is delivered, purple in delivery, blue in development, and red delivered by other projects
4.2 Adaptive Traffic Signals

Main Roads Western Australia has a large investment in computerised traffic signals infrastructure to assist efficient and safe use of the road network by motorists and other road users. The first step towards the use of centralised computer control was made in 1983 with the connection of seven signalised sites on Albany Highway to SCATS (Sydney Co-ordinated Adaptive Traffic System). SCATS is in use in all Australian states and mainland territories.

For more than a decade, Main Roads’ general policy has been to connect all traffic signals to SCATS. This is to ensure that the greatest benefit can be achieved through the use of adaptive signals control for the co-ordination of traffic movements, where appropriate. It also allows continuous monitoring of all traffic signals to assist with early intervention when faults occur. The system now comprises approximately 940 signalised sites, being controlled by 15 regional computers and a central management computer.

A recent study by developer of SCATS, Roads and Maritime Services (RMS) NSW, investigated the reductions in carbon emissions and potential economic savings from the use of SCATS. The study compared SCATS operation (a fully adaptive system) with a fixed time semi-adaptive traffic control system. It found a 28% reduction in travel times and 25% reduction in stops from using SCATS, which led to a 15% reduction in carbon dioxide emissions and 13% reduction in NOx emissions.

As with any complex system, the successful implementation and operation depends on a range factors in addition to the merits of the system. To optimise the performance of SCATS in WA, Main Roads:

- Closely monitors operation of the SCATS system via the Traffic Operations Centre (TOC) on a 24/7 basis
- Periodically evaluates system performance and uses off-line tools to update operational settings
- Accesses ongoing software development by RMS and others
- Engages in liaison and information exchange with other Australian and overseas SCATS users, and
- Trains internal staff to assist capability development.
4.3 Electronic Speed Limit Signs at Schools and Shopping Centres

School zone speed limits improve safety around schools by applying a part-time limit of 40km/h or 60km/h on school days, generally between 7.30 to 9am and 2.30 to 4 pm. Main Roads introduced Electronic Speed Limit Signs (ESLS) to improve compliance with school zone speed limits, partly in response to feedback from road users indicating confusion as to when the lower speed limits apply. The electronic signs reduce this confusion by activating only when the lower limits apply and drawing drivers’ attention to the lower limits.

Currently 143 school zone sites across Western Australia have had ESLS installed with a total of 650 individual signs in operation. Each financial year more signs have been funded and installed making this ITS device the largest individual asset maintenance type on the road network.

Figure 4.3 Electronic Speed Limit Sign for a school zone

In the 2013/14 budget papers, the Minister of Transport announced additional funding of $36m over the three year period between 2014/15 to 2016/17 to install ESLS at each school in WA. This level of investment in ESLS will make Western Australia’s ESLS program the largest in Australia.

Figure 4.4 ESLS operating for the strip shopping centre on Beaufort Street, Mt Lawley

ESLS are not only used at school zones in Western Australia. Main Roads has also adopted ESLS in four strip shopping centres to improve pedestrian safety, in Mt Lawley, Byford,
Mundaring and Worsley. Strip shopping centres with the reduced speed limits have continuous retail and commercial development along the road for extended distances and this generates high levels of pedestrian activity. Reduced speeds at these locations reduce the severity of any crashes that do occur; this is particularly important when considering safety for vulnerable road users such as pedestrians.

### 4.4 Kimberley Flood Warning Signs

Main Roads WA has successfully trialled a flood warning system in the Kimberley Region. The northern part of WA is characterised by long distances, few alternate routes and occasional cyclones and floods, meaning that accurate road status information can save travellers hours as well as reducing the risk of them being stranded.

The system consists of Variable Message Signs (VMS), CCTV cameras, water height gauges and communication systems. Real-time information on road flood conditions is communicated to the Traffic Operations Centre. Road status information is then displayed on the signs, detailing the road accessibility. The remote location of the signs makes both implementation and operation more challenging, and thus the system design needed to account for these limitations.

![Figure 4.5 Road Status Information Sign in the Kimberley](image)

The Kimberley Region has provided highly positive feedback on the effectiveness of both the floodway monitoring system and the road status updates in terms of assisting them in road network operations, delivering traveller information services and improving customer satisfaction.

### 4.5 Real Time Traveller Information at Roadwork Sites

The Gateway WA Perth Airport and Freight Access Project is Western Australia’s largest road project and it is important that traffic is carefully managed throughout the multi-stage construction as the works affect airport access and important industrial areas. To keep road
users informed of traffic conditions in real-time, the project is taking advantage of private traveller information services.

GPS data of locations and speeds is collected by Intelematics Australia from equipped vehicles undertaking their normal travels on Australian road networks. This data is one part of that used by services such as Google Maps. Travel time information for the Gateway WA project area is then provided by Intelematics Australia for display on portable road-side VMS and the project website.

The portable road-side VMS are also able to be used for incident information, increasing the flexibility of the roadwork traffic management approach.

This approach has enabled the Gateway WA project to display travel time information in locations where no such information was previously provided to road users and to keep the service running through the construction period when other technologies such as in-pavement detectors can be difficult to maintain.

4.6 Intelligent Speed Assist

An advisory Intelligent Speed Assist (ISA) is a safety technology that alerts drivers when they exceed the speed limit. ISA activates when a driver exceeds the posted speed limit for a section of road by a set speed. Audio and visual warnings activate to remind the driver that they are going too fast.

More active forms of ISA are also available; supportive ISA systems provide some degree of vehicle-initiated limiting of speed, but allow the driver to override the system and limiting ISA systems prevent drivers from speeding, except when emergency overrides activated.

Western Australia’s ISA Pilot Project was conducting from 2007-2009 and involved an advisory ISA system. Its purpose was to trial this particular form of the technology in a sample of the Western Australian fleet to:

- Create a demand within the general community for ISA as a tool that will assist drivers choose speeds that are at, or below, the posted speed limit,
- Demonstrate that reliable ISA is technically feasible on a large geographical scale, and
- Develop systems within government that are necessary for the implementation of ISA on a state-wide, or even national, basis.

The pilot was to have two phases, with the first phase using a static database of speed zones and the second phase extending to include remote updates for changes in speed zones.

![Intelligent Speed Assist displays](image)

**Figure 4.7 Examples of Intelligent Speed Assist displays**

Surveys of participants at the conclusion of the first phase of the pilot revealed a very favourable response to the utility and benefits of ISA, despite some occasional minor technical problems being experienced with the ISA units installed in some participants’ vehicles, and the problem of speed zone information being out of date in areas travelled by some participants. Unfortunately a feasibility review of available communications technologies (in 2009) was unfavourable and so the pilot did not proceed to this second phase.

Despite not proceeding to the second phase, the WA ISA project still achieved many of its objectives:
- The project demonstrated the utility and benefits of ISA to the participating opinion leaders and representatives of major stakeholder groups,
- The project also demonstrated that reliable ISA is technically feasible on a large geographical scale, and
- The project contributed to the development of systems within government that are necessary for the implementation of ISA on a state-wide, or even national, basis. This includes the state-wide mapping of digital speed zone information by MRWA and the establishment of appropriate protocols and procedures to facilitate the timely release of road network data to third parties, including commercial providers of ISA technology.

Due to advancements in communications technology since 2009, it is likely that the problems that prevented that second phase from proceeding could now be overcome.
5. What else has happened in Australia?

A few years ago, only Main Roads would have been responsible for progressing ITS activities in Western Australia. This is no longer the case, with private sector developments, national developments and actions by other Western Australian government agencies playing an increasing role. This section provides a few examples of ITS where Main Roads has played a lesser role and others have been the driving force.

5.1 Intelligent Access Program

The Intelligent Access Program (IAP) uses the Global Navigational Satellite System to monitor heavy vehicles’ road use, giving transport operators flexible access to the Australian road network to suit their specific business and operational needs. In return, the IAP provides road authorities with greater confidence that heavy vehicles are complying with the agreed road access conditions. The growing freight task of Australia means it is essential for heavy vehicles to be as efficient as possible, improving productivity, road safety, asset management and environmental outcomes.

If a road agency specifies IAP as a condition of access, transport operators enrol vehicles into the IAP, and engage an IAP Service Provider to monitor access and compliance against agreed conditions of access. The in-vehicle unit is provided by the IAP Service Provider, often as a multi-purpose unit that provides other telematics services such as fleet monitoring. This means that transport operators can work with a service provider for all their telematics requirements rather than needing to install multiple systems in their trucks.

Figure 5.1 Organisational model for the Intelligent Access Program (source: www.tca.gov.au)

Although vehicles using IAP are monitored constantly, only non-compliance reports are provided to the road agency.

IAP is a national system and so each operator only needs a single system to operate across Australia. The choice of access conditions to be managed by IAP varies between each jurisdiction. The list is gradually increasing, and in NSW now includes:

• All vehicles operating under Higher Mass Limits
• B-Triples and AB-Triples
• Quad Axle Group Permit Scheme
• Level 2 and above Performance Based Standards
• High Risk Mobile Cranes

### 5.2 Electronic Stability Control

ESC (Electronic Stability Control), also known as Electronic Stability Program (ESP), is a system that assists the driver to maintain control of their vehicle by helping to keep it stable and on course in critical manoeuvres such as a swerve or tight cornering. It does this by applying individual wheel brakes and/or reducing engine power when it senses that the vehicle is not moving in the direction that the driver is steering.

![Critical manoeuvre with / without ESP](image)

Figure 5.2 ESC assists vehicle stability (source: [www.racq.com.au](http://www.racq.com.au))

Following some ten years of development, ESC was first introduced into production vehicles in 1995. As its use spread, its safety benefits in reducing certain types of crashes started to become apparent.

In 2007, Scully and Newstead⁴ reported that ESC had the potential to reduce single vehicle injury crashes by up to 30%. The effects of ESC appeared even more pronounced in 4WD vehicles, reducing the risk of a single 4WD injury crash by up to 66%. A follow up study⁵ found that ESC reduced the risk of single vehicle crashes in Australia by 27.6% ESC also reduced rollover crashes 55.6%. Its effectiveness in preventing rollover crashes for 4WDs was even greater, reducing the risk of rollover crashes by 81.6%. Research carried out by Insurance Institute for Highway Safety (IIHS)⁶ based on all fatal crashes in the

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United States during the 10 years from 1999 to 2008, found ESC reduced fatal crash involvement risk by 33 percent.

Over the next 10 years ESC was incorporated into increasing numbers of new vehicle models and by 2009, 65% of new vehicles sold were fitted with ESC\(^7\). In June 2009, the Australian government announced an Australian Design Rule to mandatory fitting of ESC to new model passenger cars and SUVs from November 2011 for all vehicles from November 2013. The legislation will be extended to light commercial vehicles in 2015-16; at present 45% of new light commercials sold are fitted with ESC.

The acceptance of ESC has been encouraged through its support by road safety organisations, motoring clubs and the introduction by ANCAP in 2008 that vehicles must be fitted with ESC in order to gain a 5 star safety rating.

The development of ESC technology has also enabled a range of other vehicle safety features that assist the driver by improving control of the vehicle such as\(^8\):

- Autonomous emergency braking
- Rollover reduction
- Trailer sway control

The example of ESC provides some insight into how other vehicle technologies may be adopted for use in Western Australia, including technologies that take some elements of control away from the driver in certain conditions.

### 5.3 Right Move Perth

The Right Move Perth traveller information app was developed by the Department of Transport in partnership with Main Roads and the Public Transport Authority. The app is free for users with Apple iPhones and iPads or compatible Android devices.

![Right Move Perth app](image)

**Figure 5.3** The Right Move Perth app includes roadwork and incident information

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The app provides real-time information on incidents that affect a user’s journey, including roadwork, crashes, traffic signal faults, train and bus service disruptions, major events taking place, project information and weather warnings\(^9\). The app uses data supplied by Main Roads, the Public Transport Authority, the Metropolitan Redevelopment Authority, City of Perth and the Bureau of Meteorology. This data is then presented over a Google Maps view that includes Google Maps traffic conditions representation.

Upon launch, the app was heavily downloaded by users and reached the level of second-most downloaded navigation app in the Australian iTunes store behind the Google Maps app with which it shares some functionality.

5.4 Australian Approach to Cooperative ITS

Cooperative Intelligent Transport Systems (C-ITS) uses wireless communication technologies to enable different parts of the transport network to share information to improve decision making and optimise transport outcomes\(^10\). This communication will occur both between smarter vehicles, and also between smarter vehicles and intelligent infrastructure.

C-ITS will use multiple wireless communication technologies, depending on the particular application, just as your smartphone does today. Commercial networks such as GSM/3G/LTE will be used for some applications, however a specialised Digital Short-Range Communications (DSRC) approach is needed for some highly time-sensitive safety applications such as cooperative collision avoidance. The 5.9GHz spectrum for DSRC is currently under embargo by the Australian Communications and Media Authority (ACMA) to permit its future use for C-ITS.

The National Transport Commission (NTC) released its final policy paper on Cooperative Intelligent Transport Systems in December 2013\(^11\). It views road safety as the most prominent opportunity for C-ITS to make a difference in the future, with possible efficiency, productivity and environmental benefits also noted.

The NTC policy represents an important step in Australia identifying and removing any impediments to C-ITS and achieving the benefits that it offers. It builds upon the national Policy Framework for Intelligent Transport Systems endorsed by Australian transport ministers at the Standing Council on Transport and Infrastructure (SCOTI) in November 2011. These steps all form part of Austroads’ Cooperative ITS Strategic Plan, released during 2012. Austroads is continuing to work through these enabling actions in order to be ready for commercial deployments commencing between 2016 and 2018.

Although commercial deployments are still a couple of years away, there have already been a number of small and moderate scale pilots within Australia, including:

- A small-scale proof of concept in South Australia in 2010
- Systems to provide advance warning of approaching trains at level crossings, including a large test in Victoria with 100 vehicles and 8 trains at two crossings
- Establishment of the freight productivity focussed CITI corridor test-bed in NSW
- Communication of rest-area vacancy information to truck drivers in NSW using cellular communications

These pilots complement the numerous larger international pilots through their focus on applications of most relevance to Australian conditions.

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5.5 International Trends in ITS

A separate focus paper has been prepared as a companion to this Discussion Paper, covering international trends in ITS. The focus paper explores how these trends might impact on Main Roads’ activities into the future. The five trends explored in the focus paper are:

1. Changing Role of a Road Authority
2. Intelligent Infrastructure
3. Smarter Vehicles
4. The Growth of “Big Data”
5. Increased Private Sector Traveller Information

Figure 5.4 The impact on road capacity from automated vehicles and cooperative ITS is one of the elements explored in the trend towards Smarter Vehicles
6. Australian National ITS Architecture

This Discussion Paper is part of a Main Roads 2020 Strategy action to develop an ITS Master Plan consistent with the National ITS Architecture.

An Intelligent Transport System (ITS) Architecture is a set of high level viewpoints that enable plans to be made for integrating ITS applications and services\(^\text{12}\). The increasing integration between different ITS applications and services is a consistent pattern identified in the accompanying focus paper on International Trends in ITS and the more that these different component elements interact, the greater the potential benefit of an architecture that clarifies and simplifies those interactions.

Australia is currently in the process of defining a national ITS architecture. The vision that has been outlined for this architecture is to "enable industry and government to optimise the community benefits of ITS through a framework that promotes a common understanding and purpose through consistent application while fostering collaboration, consumer choice and innovation"\(^\text{13}\). This vision is well aligned with the 2020 Strategy’s focus on making technology work for the community.

Figure 6.1 below sets out the eight functional areas in the European FRAME architecture upon which the Australian ITS architecture is being based.

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<td>Provide support for law enforcement</td>
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<td>Manage freight and fleet operations</td>
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*Figure 6.1 ITS Functional Structure of the FRAME Architecture*

Of the eight functional areas in Figure 6.1, it is area 3 (manage traffic) which is the focus of many Main Roads activities. In addition to managing traffic, Main Roads also interacts or may in future interact with all seven other functional areas. Each functional areas is not restricted to the traditional activities of a road authority and extends not only into the broader government transport portfolio but more generally into the transport domain. This wide coverage is reflective of the interactions that occur within the transport management activity covered by ITS. These interactions mean that for Main Roads to make effective use of this ITS architecture, engagement with portfolio and industry stakeholders will be essential.


Part of the flexibility of FRAME is that it does not require every part of the architecture to be made use of, but rather only the relevant functional areas and elements within those functional areas. The architecture elements most relevant to Main Roads stretch outside the traditional domain of manage traffic. For example, the interaction with manage public transport operations is a necessary part of improving priority for buses and the interaction with provide journey traveller assistance is necessary for effective traveller information.

The flexibility of FRAME includes in some cases multiple approaches to achieve a similar outcome, as the “FRAME Architecture is not so much a model of integrated ITS, as a framework from which specific models of integrated ITS can be created in a systematic and common manner”\(^{14}\). Due to this, Main Roads will need to consider whether it wishes to adopt for Western Australia a more tightly specified architecture within the framework provided by FRAME.

Austroads is continuing work on a national approach to ITS architecture that may provide an Australia-wide approach with this greater definition. In some cases, however, it will not be possible to wait. Although the architecture development is already underway, there are likely to be ITS initiatives that need to progress before any such detailed national guidance is available and case-by-case decisions will need to be made to minimise future architectural conflicts.

Figure 6.2 The large and increasing number of actors in ITS that interact with the systems increases the need to have a clear ITS architecture (source: www.frame-online.net)

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\(^{14}\) [http://www.frame-online.net/?q=the-architecture/About-the-architecture.html](http://www.frame-online.net/?q=the-architecture/About-the-architecture.html) accessed 22 January 2014
7. Next steps in developing the ITS Master Plan

This Discussion Paper is the first step in the process of developing the ITS Master Plan. The conversation started by this Discussion Paper will now continue into stakeholder workshops scheduled for early 2014.

What the Master Plan developed following these workshops must contribute to in order to be successful is clearly defined by the 2020 Strategy:

Optimised road network performance (mobility and safety) through the use of ITS services and tools consistent with DoT transport strategies and plan while minimising Whole of Life Cycle costs

This Discussion Paper and the accompanying focus paper on International Trends in ITS make it clear that in developing the Master Plan, Main Roads must consider not only how to maximise the benefits of its own direct investment in ITS, but also how to encourage and leverage investment by others.

Four questions for stakeholders to consider as we develop this Discussion Paper into a Master Plan are:

1. How can ITS play an enhanced role in helping Main Roads and the transport portfolio meet Western Australia’s transport challenges?
2. What can Main Roads do to accelerate beneficial adoption of ITS throughout the transport domain (government, industry and transport users) in a way that delivers benefits for Western Australians while effectively managing risks?
3. What can Main Roads do to improve its investment in ITS to maximise community benefits and minimise costs?
4. What can Main Roads do to improve its governance, management and operation of ITS to support these initiatives?

Feedback and Questions

If you have any feedback or questions about this Discussion Paper or the ITS Master Plan, please contact either:

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Appendix A: Preliminary Investment Logic Map