TRANSMAX

ITS platform

STREAMS®

TRANSMAX

A full-service ITS solutions provider

About us

Transmax is the solutions provider of the international award-winning ITS platform STREAMS®. We exist to improve people's lives by providing industry-leading transport solutions and help move millions of commuters around Australian road networks every day. STREAMS® was first developed as part of Queensland's Department of Transport and now, as a government-owned entity, Transmax supports other transport departments around Australia and internationally to achieve safer and more reliable road journeys for people in the communities they serve.

We place our customers at the centre of everything we do and work collaboratively to ensure our ITS solutions meet their needs. Transmax offers customers systems engineering, software design and development, along with a range of consulting and support services throughout the entire ITS lifecycle, all delivered with customer service excellence.

With almost 50 years of ITS experience, Transmax helps customers realise the community benefits of optimising transport networks by providing smarter, more sustainable ITS solutions.

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ITS platform

STREAMS® connects to, and integrates, a range of field devices to allow road authorities to monitor and manage their transport networks through a single, graphical user interface that is underpinned by real-time data.

ITS platform

One of the key challenges facing road agencies today is maximising road network efficiency while reducing impacts on the community. Increasingly, road agencies are turning to more sustainable solutions to manage growing traffic congestion as an alternative to traditional road infrastructure expansion, which is expensive and often involves the introduction of tolls to recover costs.

Transmax is helping road agencies and operators deliver community benefits to more than 15 million Australians by providing innovative ITS solutions through the company's ITS platform, STREAMS®.

STREAMS® is a complete, integrated ITS solution supporting a comprehensive range of services and infrastructure, making it possible to run traffic signalling, incident response, motorway management and other traffic services from a single system. Customers are realising the tangible benefits of optimising their transport networks while delivering significant community benefits including reduced travel times, improved road safety, fewer accidents, and a cleaner environment through reduced carbon emissions.

In addition, Transmax offers a wide range of solutions consulting, support services and hardware that draw on our capabilities which encompass the entire ITS lifecycle, from planning and execution through to optimisation, operations and support.

STREAMS®

- Arterial Management
- Business Intelligence
- Device Management
- Emergency Vehicle Priority
- Heavy Vehicle Management
- Network Video Management
- Schematics
- Smart Motorways
- System interfaces
- Traveller information

Benefits of an integrated ITS platform

Road agencies, motorists and the broader community benefit significantly from STREAMS®.

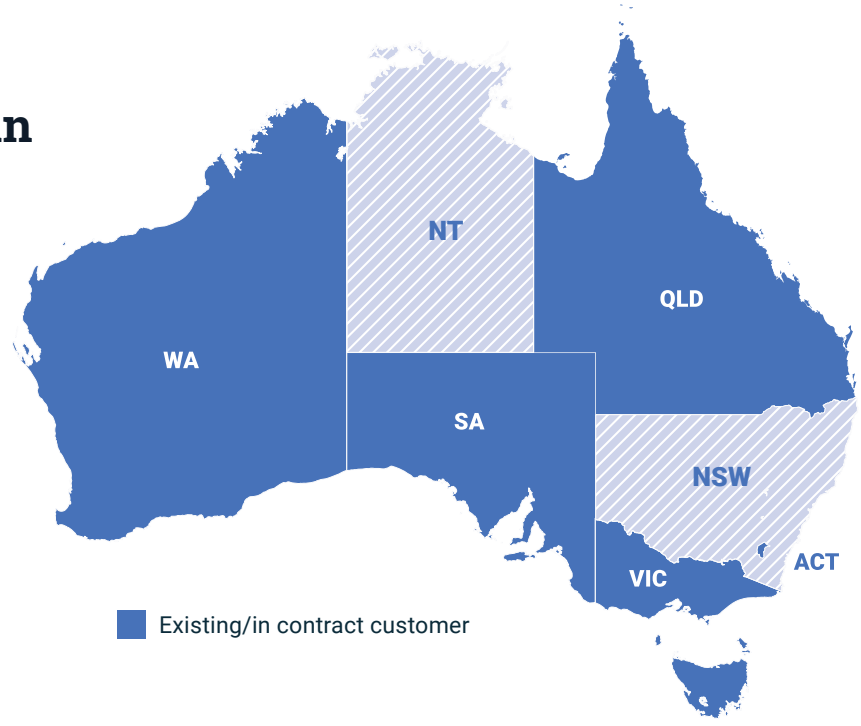
COST EFFECTIVE	INTEGRATED	SECURE	HOLISTIC	CUSTOMER CENTRIC	COMMUNITY BENEFITS
Highly configurable modern platform	Single user interface	Improved data network security	Enables holistic road network management	Familiar & intuitive user interface	Reduced travel times
Modular scalable architecture	Synergy between existing systems & equipmemt	Secure flexible data communications	Meets a range of ITS functions	Ability to do more with less	Safer roads
'Policy-based' rules engine	Optimise network performance	Built using trusted technologies	Support for legacy equipment & systems	Efficient data management	Reduced emissions
Simpler interface management & acceptance testing	Platform for collaboration & optimisation			Expectation management through STREAMS® data	Reduced vehicle operating costs
Consistent & easy to enter policies	3rd party interfaces				
Flexible licensing options	Plugable algorithms				
	Internal geographic information				

How we work with you

Transmax has a systems methodology that ensures the ITS solutions delivered are customer driven, flexible and sustainable. Through this methodology, Transmax aims to:

- Address customers' needs with fit-for-purpose, collaborative and efficient solutions that consider the people, processes, data and technologies involved as inherent components of the system.
- Promote and entrench customer-centricity through a shared solutions focus on delivering sustainable community benefits.
- Optimise the solution from strategic inception to implementation and beyond.
- Ensure customers consistently receive outstanding products and services that provide real and continuing value.

STREAMS® in Australia



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Schematics

Schematics provide traffic management centre operators with a stylised view of the road network. This view can be used to present detail about the road geometry, lane markings, ITS devices and road operation that is difficult to represent on a geographical map.

Schematics

VIDEO WALL SCHEMATIC

- Real-time awareness of congestion and possible incidents
- Increased efficiency in incident identification and resolution

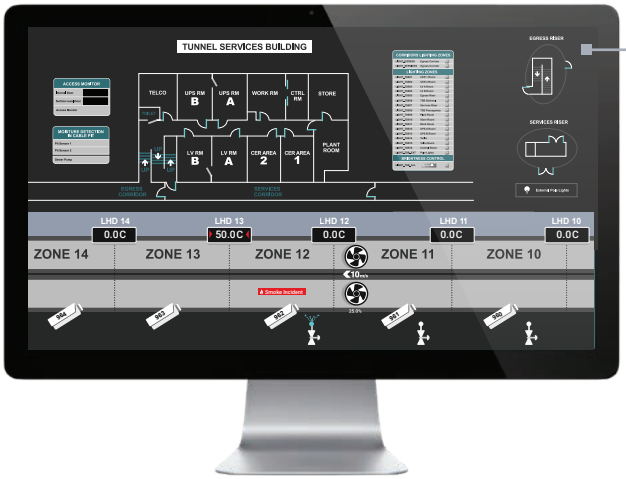
MOTORWAY SCHEMATICS WITH FIELD RESPONSE

- Monitoring, data validation and full real-time control over traffic systems and devices
- Optimised user-interface efficiency
- Visualisation of device status in a larger area
- Increased efficiency of incident and congestion management
- Scalable

ROAD CONDITION INFORMATION SIGN SCHEMATICS

- Strategic traffic management of signs that are widely dispersed
- Initiate response plans by right-clicking on any link and selecting the appropriate plan
- Response plans can be used to change the state of road condition information signs

Transmax's road schematics have been developed to work with STREAMS®. They are intuitive, readable, clutter-free and minimise eye strain. They provide context to assist in decision making.

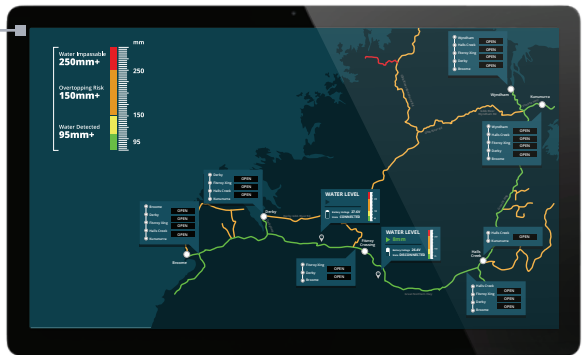


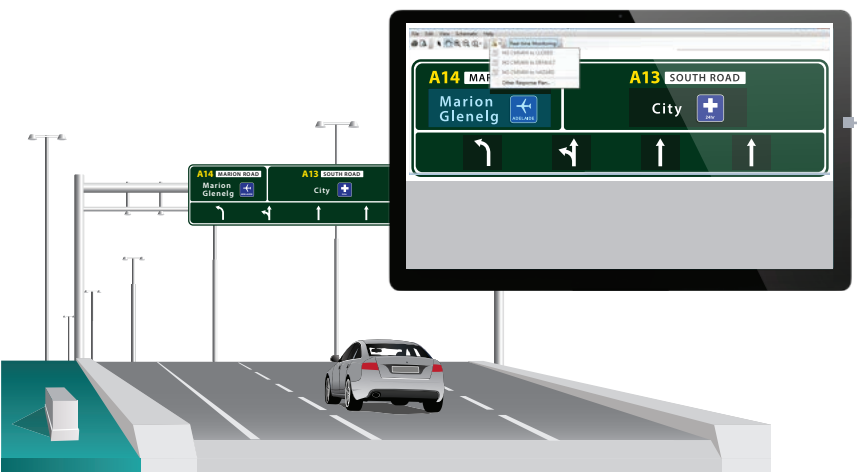
SCADA SYSTEM INTERFACE

- Consistent user interface for traffic management centre operators
- Simplified training of traffic management centre staff

FLOOD MONITORING SCHEMATICS

- Dynamic awareness of device status and interaction
- Increased efficiency and control in managing flooded roads





MULTI-PANEL CMS SIGN SCHEMATICS

- Simplify control of multi-panel signs
- Easy to understand

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ITS platform
STREAMS®

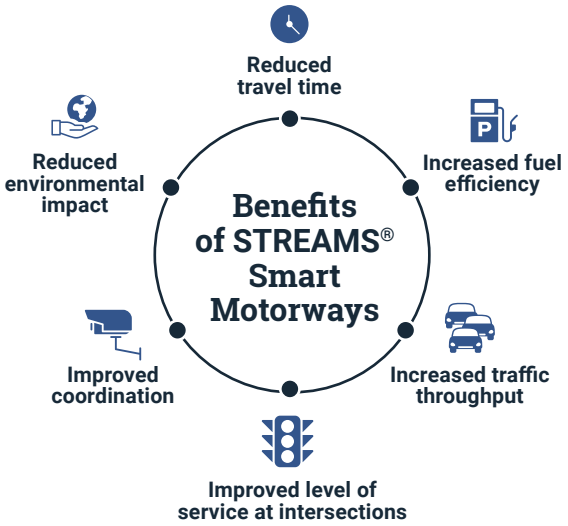
Smart Motorways

Smart motorway technologies can deliver substantial improvements in traffic management and safety.

Smart Motorways

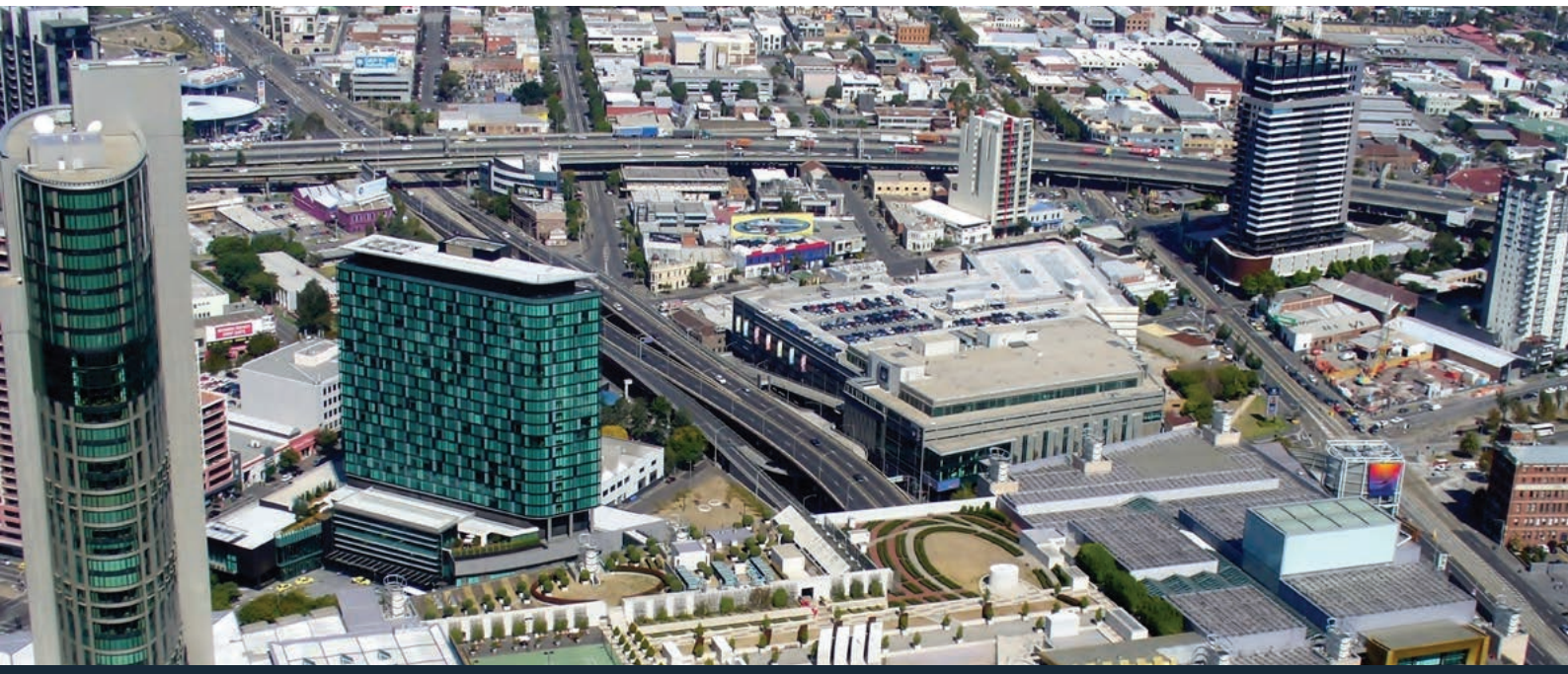
STREAMS® Smart Motorways capitalises on the capabilities of the integrated STREAMS® ITS platform to deliver a complete smart motorways solution for customers.

Customers using STREAMS® to manage motorways are realising significant community benefits including:



STREAMS® Smart Motorways has a range of features that support the delivery of a complete traffic management system for road authorities nationally and internationally:

- Adaptive on-ramp metering
- Rules-based engine to manage speed limits, lane closures, variable message signs and ramp metering sites
- Off-ramps integrated with traffic signals to prevent queuing onto motorways
- Control of variable speed limit signs
- Control of lane use management signs
- Vehicle detection to collect traffic measures and provide data for ramp metering and travel time estimation
- Control of dynamic message signs to inform motorists of incidents, travel times, diversions or display informative safety messages
- Integration with video incident detection systems
- Predefined incident response plans
- Automatic travel time advisory
- Environmental monitoring – advise motorists of road conditions during severe weather events
- Closed Circuit Television (CCTV) integration



Benefits realised after improving Victoria's most congested freeway with a STREAMS® ITS solution:

Economic benefits estimated at
$2m per day

An increase greater than
50% in sustainable peak flows

Travel time reduced by
42% during peak periods

Accidents reduced by
60% in the CityLink tunnel

Accidents reduced by
30% on the motorway

Travel time reduced by
48% in the CityLink tunnel

GREENHOUSE GAS emissions reduced by **11%**

Motorways access, use and exit management

COORDINATED RAMP METERING

Ramp metering uses signals to regulate on-ramp flow where there is a risk of flow breakdown occurring on the motorway. It can operate either using a time of day schedule, or adaptively using algorithms to monitor motorway performance and respond based on the current conditions. With support from the academic community, Transmax offers the coordinated ramp-metering algorithm suite ALINEA/HERO. The modular architecture of STREAMS® means Transmax is able to integrate new algorithms as they become available.

STREAMS® applies the computed metering rates using ramp signal controllers deployed at the roadside. Controlling multiple consecutive ramps, ideally the whole motorway, makes it possible to maintain a more consistent motorway flow and prevent flow breakdown. Using HERO, STREAMS® is able to balance queues across multiple ramps and maximise motorway performance.

In 2007, VicRoads commissioned Transmax to implement a coordinated ramp metering trial system on a 15 km section of Melbourne's most congested freeway, the Monash Freeway (M1). The Transmax STREAMS® ITS solution deployed intelligent motorway on-ramp metering to manage the upstream demand to not exceed the freeway capacity. The system exceeded expectations by reducing delays, improving reliability and increasing traffic throughput.

RAMP CLOSURE

Closure of a motorway on-ramp may be required in the event of a major incident. STREAMS® Smart Motorways can modify the operation of the controlled intersection and variable message signs at the start of an on-ramp to close the ramp and advise motorists of the closure.

RAMP QUEUE CLEARANCE

The risk of an accident on a motorway increases significantly if a queue is allowed to extend into a high-speed section of the motorway. This can be caused by insufficient green time at the intersection at the bottom of an off-ramp or at the end of the motorway (where it terminates into an arterial road). Smart Motorways can detect when this condition is likely to occur, and provide more green time to clear the queue.

LANE CONTROL

Lane control is used to dynamically open and close lanes in response to the current traffic conditions. It may be used during incidents to close the affected lane/s or during peak periods to create an extra lane using hard-shoulder running. Smart Motorways includes a rules-based engine that assists operators to create a lane closure strategy involving multiple lane control gantries and variable speed limits. Rules include how the lane closure taper is implemented and how the speed limit is stepped down as motorists approach the closure.

Motorways speed management

Dynamic speed limits use variable speed signs to advise motorists when speeds have been changed from the prescribed limit. An operator can request a speed change in response to a known incident or road conditions. STREAMS® can automatically display a supporting message on surrounding variable message signs.

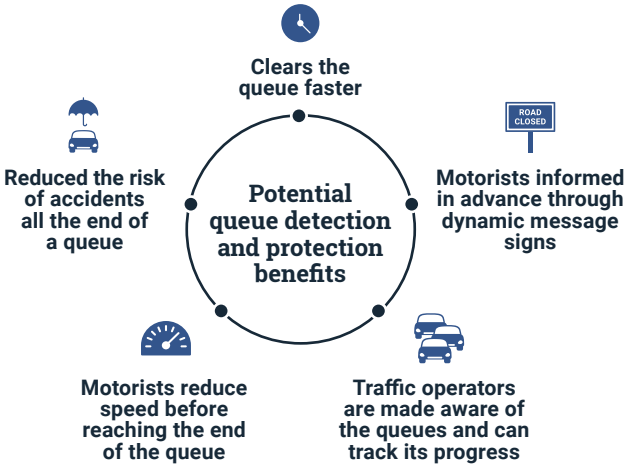
WEATHER RESPONSE

STREAMS® is able to detect a change in weather conditions and automatically apply an appropriate speed advisory message. This may be supplemented by messages on surrounding variable message signs.

QUEUE DETECTION AND PROTECTION

STREAMS® queue detection provides the ability to automatically detect and monitor traffic queues on motorways.

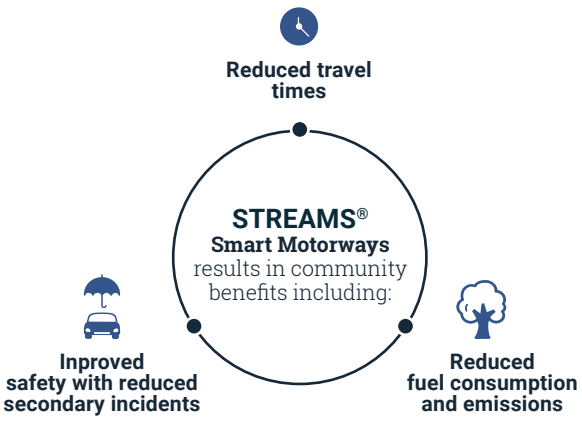
The queue protection algorithm makes speed recommendations using variable speed signs. It recommends changes within and extending past the end of a queue, to ensure motorists are provided with adequate warning of the changed conditions.



Using rules to manage motorway incidents

A unique feature of STREAMS® Smart Motorways is its rules-based engine to manage speed limits, lane closures, variable message signs and ramp metering sites in the event of motorway incidents, planned events and inclement weather conditions.

Optimising motorway lane usage via the rules-based engine enables the use of less than 25 rules rather than traditional traffic control systems that often use 1000s of individual traffic management plans, significantly reducing a traffic management centre operator's workload. Operators simply identify the location and nature of the incident to initiate a response and then STREAMS® generates and implements the appropriate response plan automatically.



INCIDENT DETECTION

Smart Motorways supports the use of specialised incident detection systems. These systems use video image processing to detect stationary vehicles or pedestrians in tunnels or on motorways. STREAMS® can integrate with these systems to provide comprehensive incident detection and response capability.

INCIDENT RESPONSE

The STREAMS® incident response system recognises that in the majority of cases, responding to incidents that are similar in nature and severity will involve the same sequence of actions.

These sequences of actions can be predefined as incident response plans. These plans are templates which are customised by the details of the incident being responded to and may contain manual and automatic actions.

INCIDENT VERIFICATION AND LOGGING

STREAMS® provides tools that allow operators to verify incidents and record incident details in the system. Incidents are classified into a number of categories including accident, breakdown, hazard, flood, roadworks and planned event.

An incident's classification, together with other details, determines the response plan that will be presented to the operator in the response phase.

Traveller information

INCIDENT INFORMATION

STREAMS® incident response will suggest messages to the operator for the variable message signs around an incident. The operator may accept, modify or reject the suggested messages.

An operator may also request a message to be displayed on a variable message sign independently of the incident response system. Incident information can be published to the internet to provide information to travellers before they begin their trip.

AUTOMATIC TRAVEL TIME ADVISORY

Motorists value the provision of travel time information while on the motorway, particularly where travel time to the same destination via a different route is provided. This information allows road users to make informed choices about their route, reduces their travel time, and prevents them contributing to congestion.

SERVICES

Transmax provides an ALINEA / HERO optimisation service, which is offered to customers using STREAMS® Smart Motorways on a fixed-price, per-ramp basis.

In addition, Transmax offers customers a schematic design service providing customers with an interactive, detailed view of a motorway and all associated field equipment.

Operators can customise this revolutionary schematic view to suit their needs and STREAMS® renders this interactive view on high resolution backgrounds.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Device Management

STREAMS® connects to, and integrates, a range of field devices to allow road authorities to monitor and manage their transport networks through a single, graphical user interface that is underpinned by real-time data.

Device Management

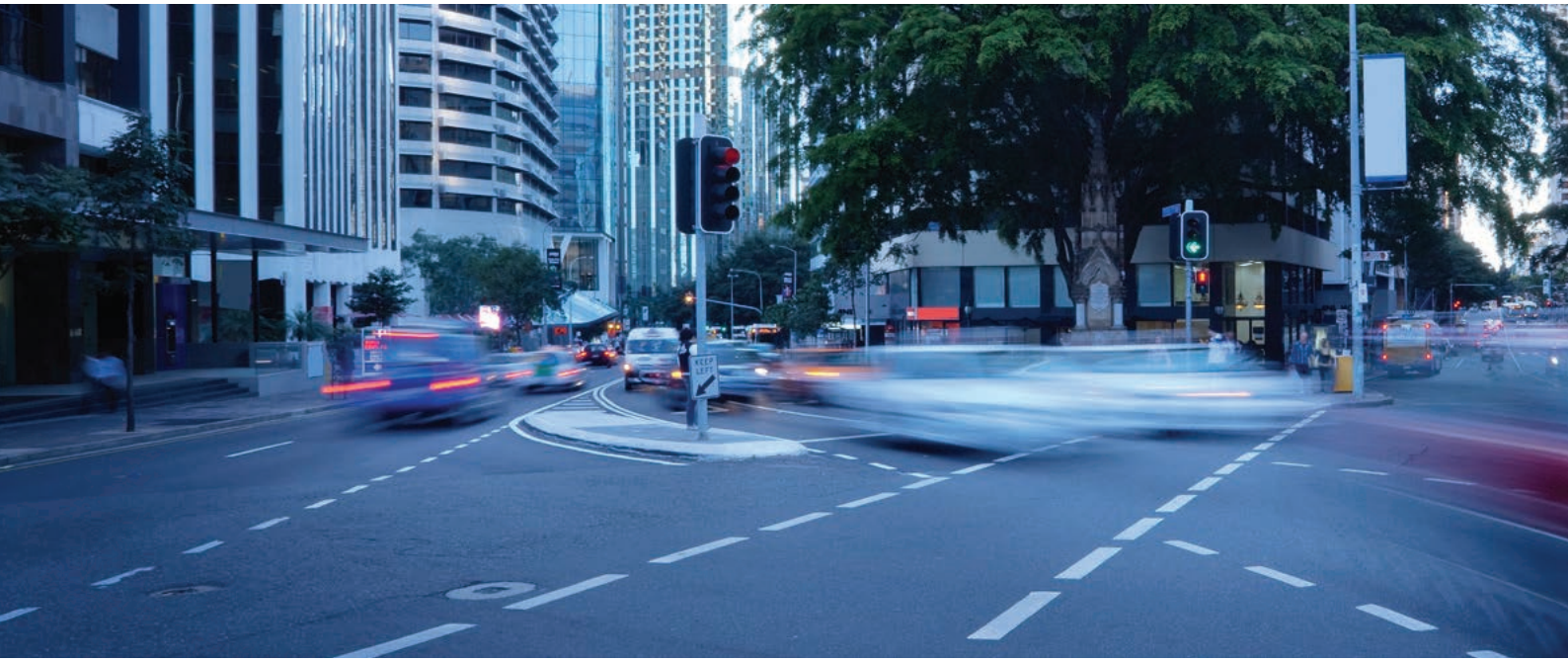
The Intelligent Transport System (ITS) industry produces a variety of field devices that perform important functions to help manage and optimise transport networks. STREAMS® provides transport authorities with a single, secure integration platform to manage these devices.

Using a single platform to connect to and integrate a range of field devices allows operators to monitor and control the system using a single, consistent graphical user interface. It also provides flexibility for customers to deploy best-of-breed technologies to meet various use cases as STREAMS® can interface to any device or protocol simply by building a new device driver module.

INTELLIGENT LOGIC

The use of real-time data from field devices in an integrated ITS platform enables intelligent logic that can automatically drive adjustments based on changes anywhere in the transport network. For example, STREAMS® can use information it receives from environmental monitoring devices to set messages on variable message signs, advising road users of road conditions during severe weather events.

The data from detectors on motorways is used as an input into sophisticated algorithms that integrate with traffic signals near motorway on-ramps and off-ramps. This prevents traffic from dangerously queuing from an off-ramp back onto the motorway, and regulates the on-ramp flow where there is a risk of breakdown occurring on the motorway.



The integration with video incident detection systems and automated incident detectors can assist operators to swiftly detect and verify an incident has occurred on their transport network.

DEVICE DRIVER MODEL

STREAMS® uses the same device driver model employed by computer operating systems. Using this driver model, STREAMS® supports a vast number of different standards and protocol variations. Transmax can write new device drivers with relatively minimal effort, reducing the barrier to entry for customers to utilising new devices available in the market. Transmax also aims to support major standards as part of its product development roadmap.

STREAMS® COMPATIBILITY TESTING

Road authorities using STREAMS® require confidence that new devices they to add to their system will work. Transmax provides a service to ITS device vendors to certify that their devices are compatible with STREAMS®.

PROTOCOL COMPLIANCE TOOL AND TESTING SERVICE

To assist ITS device vendors to support industry standard protocols, Transmax provides a tool that tests vendor implementations for compliance against these protocols. Transmax will then certify this compliance as part of compatibility testing.

Transmax also provides a service to road authorities and ITS integrators for testing the implantation of devices they are procuring for protocol compliance. This ensures that the devices correctly implement the standard protocol in addition to being supported by the STREAMS® ITS platform.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Arterial Management

STREAMS Urban Traffic Control (UTC) optimises the routes, intersection groups, intersections, and movements within a road network to ensure they operate in synergy and enhance traffic flow.

STREAMS® Arterial Management

STREAMS® Urban Traffic Control (UTC) is a dynamic system that responds to changes in current traffic conditions by using real-time data and application of smart algorithms to make changes to on-road traffic operations. With almost 50 years of continuous development, STREAMS® UTC improves safety and reduces congestion.

Through integration of STREAMS® UTC into the STREAMS® ITS platform, Smart Motorways can send requests to STREAMS® UTC regarding intersections situated near the end of motorway off-ramps. Smart Motorways detects when it is likely that a queue on a motorway off-ramp could queue onto the motorway and requests STREAMS® UTC provide a longer green cycle time to clear the queue. Without the ability to communicate between systems, and due to a general lack of integration of other UTCs with sophisticated motorway management systems, busy off-ramps continue to dangerously queue traffic back onto motorways, significantly increasing the risk of dangerous, high speed accidents.

ABILITY TO HOLISTICALLY MANAGE TRAFFIC ACROSS AN ENTIRE NETWORK

STREAMS® UTC, as part of the ITS platform STREAMS® can manage and optimise traffic across an entire road network.

MODERN COMMUNICATIONS NETWORKS

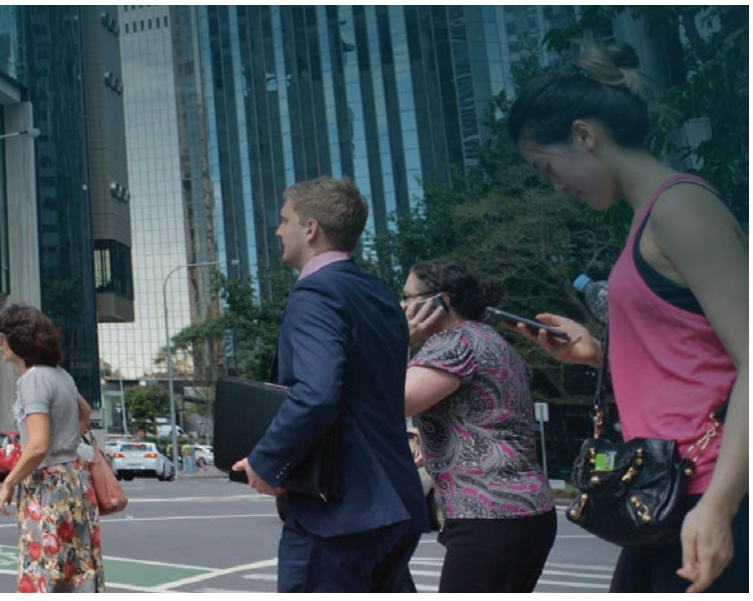
As well as supporting traditional networks, STREAMS® can use modern communications networks including xDSL, fibre and wireless technologies. These links can be shared with other ITS equipment (such as CCTV) without impacting on intersection operations.

CONTROL HIERARCHY

STREAMS® manages traffic signal networks by organising controlled entities into the following hierarchy:

- routes
- intersection groups
- intersections
- movements

The control parameters are adjusted continuously in real time to optimise coordination and minimise delay.



COORDINATION POLICY

Traffic engineers nominate the required coordination policy to influence the coordination along each route. Three policy options are available:

Maximise coordination
The route is coordinated from end-to-end for peak hour and other universal scenarios.

Minimise delay
The route breaks into smaller segments to optimise coordination for local traffic conditions.

Balanced
Smaller segments will attempt to group and run together to strike an optimal balance between maximising coordination and minimising delays.

Intersection groups are merged and diverged again to support the current coordination route segments.

The optimised plan for the prevailing traffic conditions is chosen to minimise delays. Vehicle and pedestrian movement demands are calculated every cycle and the optimal plan is chosen to ensure the efficient allocation of capacity for the current demands.

Performance measurement and reporting

STREAMS® continuously measures system performance to optimise current operations and provide historical reports, including:

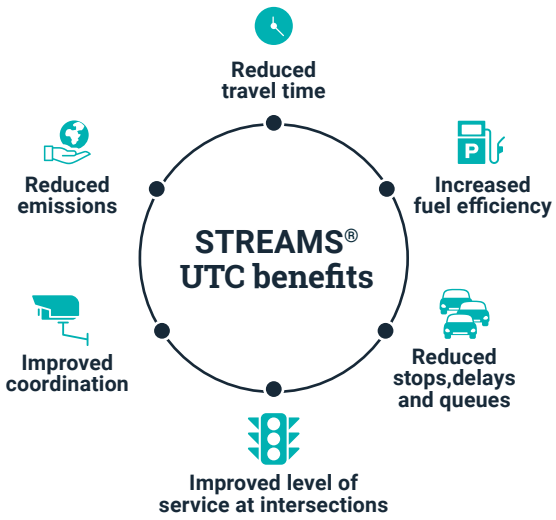
- **Queue length**
- **Throughput**
- **Stops**
- **Delays**
- **Saturation**

A full range of reports is provided for operators and engineers. Both real-time and historical reports can be generated for individual intersections, intersection groups and routes.

Interface to third-party system

An attribute of STREAMS® is its ability to interface with other urban traffic control systems such as SCATS®. Through a customised interface, customers can realise the benefits of an integrated ITS platform while still using their existing system.

The STREAMS® interface to SCATS® adds significant value to SCATS® software installations to maximise transport road network efficiency. The SCATS® interface delivers immediate user benefits even prior to integrating with other devices or systems. It requires minimal setup and provides sophisticated automation of the creation of SCATS® configuration data. With a STREAMS® system in place that can meet all of a customer's ITS requirements, operators can see immediate benefits while engineers migrate legacy equipment such as variable message signs to the new platform.

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5183
Ambulance
QUEENSLAND - THE SMART STATE

ITS platform
STREAMS®

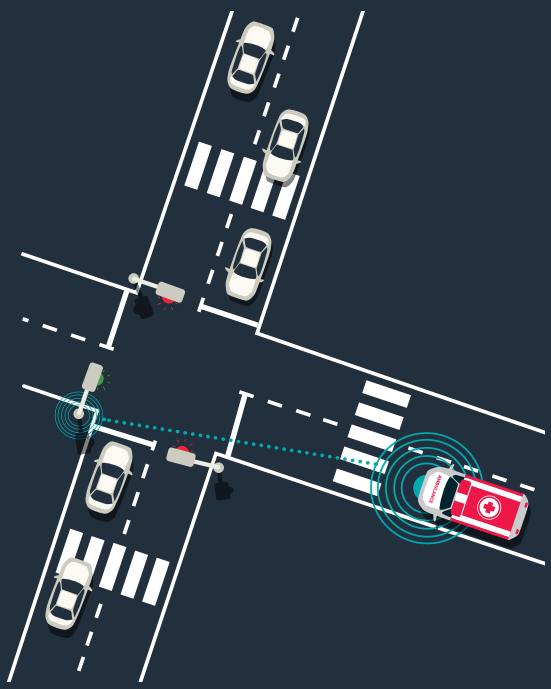
Emergency Vehicle Priority (EVP)

When every second counts in an emergency, EVP is helping save lives.

Smart ITS solution improves emergency vehicle travel times and benefits the community

A growing and ageing population has seen increased demand for emergency services. Coupled with increasing traffic congestion, the need arose to employ smart technologies to maintain and improve emergency services travel times while keeping other road users safe and minimising traffic disruptions.

STREAMS® Emergency Vehicle Priority (EVP) is an intuitive and dynamic ITS solution that automatically interrupts normal traffic signal operations, providing a green traffic light signal to emergency response vehicles in advance of their arrival at an intersection.



The benefit of the technology is that it helps reduce emergency vehicle travel times whilst enhancing the safety of frontline officers, other road users and the broader community. Every second counts in an emergency and using a smart ITS solution such as EVP to reduce the time it takes for an emergency vehicle to arrive at an incident is helping save lives.

WHAT IS EVP?

Emergency Vehicle Priority (EVP) tracks the location of ambulance and fire emergency vehicles responding to emergency call outs. It uses computer-aided dispatch, GPS and traffic management technology to determine the location of an emergency vehicle, calculate estimated times of arrival at intersections and send a message to the traffic control system that an emergency vehicle is approaching. The traffic control system then provides a green light in advance of the arrival of the vehicle at the required traffic signal when it is safe to do so.

STREAMS® EVP incorporates dynamic interventions for minimal traffic impact, pedestrian clearance protection, live monitoring at traffic management centres, and user-configurable recovery algorithms.

Emergency Services, road authorities and the community all benefit from EVP

- Reduces travel time by providing priority for emergency response vehicles (ERVs) through traffic signals
- Reduces the number of times ERVs needs to cross intersections against the lights
- Contributes to lives being saved by assisting ERVs to progress to incidents more efficiently
- Improves safety of drivers, pedestrians and other road users
- Improves incident clearance rates
- Supports emergency response personnel to meet response targets
- Assists ERVs to more efficiently manage increasing traffic demands
- Assists in safely and effectively responding and attending to emergency incidents
- Reduces likelihood of accidents during emergency responses
- Provides a safer work environment for frontline officers
- Reduces noise pollution as EVP allows emergency vehicles to operate in 'lights only' mode more frequently
- Reduces the need to increase the number of frontline officers or ERVs to maintain service levels
- No change to frontline officer business procedures required to use the system
- Improves resource efficiency
- Minimises impact on other road traffic
- Minimises installation and maintenance costs by using existing infrastructure
- EVP can be adapted for other users such as buses and heavy vehicles
- Allows a policy-based approach to giving priority to special classes of road users (like emergency vehicles)
- Promotes inter-agency collaboration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Heavy Vehicle management

Transmax is working on an exciting and intelligent technology to improve heavy vehicle safety in urban areas through an enhancement to STREAMS®.

Heavy Vehicle Management

STREAMS® Heavy Vehicle Management utilises EVP technology to make urban roads safer despite the growing number of heavy vehicles sharing increasingly constrained and congested road networks.

Through the application of proven data communications, traffic signal and transport system technologies, STREAMS® Heavy Vehicle Management can:

- detect when a heavy vehicle is unlikely to stop at an intersection and extend the green phase
- detect and prioritise the passage of heavy vehicles on approved routes to improve safety and community benefits
- create heavy vehicle green waves for registered vehicles to provide safe conditions for dangerous goods and wide loads.

BENEFITS

- Improving safety for all road users
- Community benefits from a reduction in the amount of compression braking
- Increased cost savings through less wear and tear caused by braking and accelerating
- The solution provides drivers with a safe way to improve heavy vehicle travel times by decreasing the time spent stopped at red traffic signals, in addition to the time spent decelerating and accelerating.

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STREAMS®
Business Intelligence

Business Intelligence (BI) is designed to deliver timely, accurate, aggregated historical information to produce a range of business intelligence reporting tools for a variety of users.

STREAMS®
Business Intelligence

STREAMS® Business Intelligence (BI) is a tool that allows users to easily analyse road network data. The provision of strategic transport intelligence and network insights and foresights to managers allows them to make more accurate decisions when managing road networks.

Transmax understands that road network information and data is of great value to road agencies. STREAMS® BI aims to provide valuable transport and traffic information to people beyond the traffic management centre. STREAMS® BI simplifies the way intelligent transport and traffic information is viewed and shared. The type of information and how it is presented through STREAMS® BI enables decision makers to analyse problem areas and efficiently establish action plans for strategic hot spots.

STREAMS® BI offers key capabilities including:

- **Dashboards**
  high-level, single-page overviews of a transport network that can show key data at a single glance
- **Whole-of-network KPI reporting**
  reports that cover the entire road network for all available historical data to allow KPIs to be tracked over time
- **Technical reporting**
  fine-grained reports with dozens of data measurements for small regions or even specific intersections or detectors
- **Ad-hoc analysis**
- **Data exports**
- **Adaptability**

STREAMS® BI provides access to reliable traffic and device data that can provide benefits including:

- Reducing whole-of-life costs of asset maintenance and reporting
- Optimising traffic networks based on real data
- Providing supporting information regarding the key factors that will make the most significant difference to a traffic network
- Enhancing knowledge-sharing across the organisation and between stakeholders
- Using learnings from history to improve processes
- Predicting future performance based on network trends

TRANSMAX

+ 61 7 3355 8700
info@transmax.com.au

Transmax Pty Ltd
Level 5 / 143 Coronation Dve
Milton QLD 4064
Australia

www.transmax.com.au