

USE
ALTERNATIVE
ROUTE N80



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The National Roads Authority – Going Places ITS (Intelligent Transport Systems)





It is clear that in the absence of substantial further investment, the level of service provided by the national road network would deteriorate steadily in the years ahead due to the inability of the network to cater for rising traffic volumes.



ITS (Intelligent Transport Systems) in Ireland

The NRA's primary function is *"to secure the provision of a safe and efficient network of national roads"*. It has overall responsibility for the planning and supervision of construction and maintenance of national roads. This will be achieved through the construction/upgrade of the roads network in line with the policy set out by government in the National Development Plan, 2000-2006 and taking account of the National Road Needs Study which reviewed road improvement needs up to 2019.

Until recently, this approach to the improvement of the road infrastructure has been the case throughout the EU, but now the focus has shifted towards a proactive and strategic management of the existing road network infrastructure. In the industry this change from a Design and Build function to one of Operational Management has been described as "the Big Shift". This can be achieved by a multitude of different approaches, but the relative cost of the various associated technologies now means that ITS can play a major role in the management of the roads network as a further contribution to greater efficiency.



What is ITS?

ITS (*Intelligent Transport Systems*) has a number of different definitions, none completely encompassing all that it covers. Previously known as Transport Telematics, ITS is commonly regarded as the application of modern computer and communications technologies in transportation systems, resulting in improved mobility, safety, air quality, productivity and information.

How does ITS help?

As stated ITS utilises computer and communications technologies. This covers a wide range of possible applications. Examples of typical ITS transport applications are:

- **“Intermodal” transportation systems**, which will make it easier for travellers to switch from one “mode” (e.g., private car) to another (e.g., bus or rail travel) at certain interchanges.
- **Intelligent traffic control systems**, which automatically adapt to the flow of traffic and reduce unnecessary stop-time for drivers at red lights.
- **In-vehicle technologies**, such as traveller information and route guidance systems.
- **Safety enhancement technologies**, such as “smart” cruise control systems that take into account the location of surrounding vehicles.
- **Traveller advisory systems**, including variable message signs and advisory radio.

What is the NRA doing?

The purpose of this document is to show, in terms of ITS, what the NRA has done in the past, what it is doing and its vision for the future.

Speed detection camera



A History of ITS in Ireland

The NRA has already implemented a variety of ITS systems throughout the National Roads Network. The following are the main systems in operation:

Automatic Vehicle Counter/Classifiers

Automatic Vehicle Counters provide information on the volume of traffic by hour of day and vehicle class, i.e., motorcycle, car, goods vehicles distinguished by number of axles etc. with up to twelve vehicle classes being identified.

Example loops embedded under road pavement



Vehicles are detected by passing over induction loops embedded in the road surface.

Through analysing the electro-magnetic profiles of passing vehicles the vehicle can be counted and classified, based upon length and number of axles.



Passing vehicle identified, classified and logged by traffic counter/classifier

Traffic count and classification data is then downloaded at regular intervals and imported into a national traffic count database. The database represents the backbone of traffic census and analysis work and is used to inform national road network improvement plans and management strategies.



Road Ice Monitoring System - ICECAST

The NRA has implemented an Ice Monitoring system for National Roads that allows local authorities to predict, to a certain degree, whether specific sections of the roads network are likely to encounter snow or ice conditions during the colder months. The road surface is monitored by a series of Ice Monitoring stations



Ice Monitoring Weather Station

These stations are strategically positioned throughout the National Road network. Each station is monitored remotely by a central system. The data collected can provide a reasonable assessment of the current road condition.

The data is collected centrally and, through the services of Met Eireann, future weather and road condition is forecast.

Based upon this information local authorities are able to make sound judgements, on a day-to-day basis, as to when pre-emptive action is necessary to treat the road (i.e. gritting) in order to prevent ice forming.

The National Roads Authority has recently launched an on-line internet weather reporting service that provides regular up-to-date reports on the latest weather data for each monitoring station on the national roads network. For more details see <http://www.nra.ie/RoadWeatherInformation>



N7/N8 Congestion Monitoring/Alternative Route

An "Alternative Route" system has been set up along the Kildare-Portlaoise section of the N7/ N8 corridor between Dublin and Cork/Limerick. Using traffic loops embedded in the road pavement at strategically chosen locations, it is possible to sense traffic movement and ascertain queue levels at the "bottlenecks" of Monasterevin and Kildare town.

This information is processed using software systems and an automatic message is generated to provide road users with information on queues and, if necessary, a suggested alternative route to avoid queues.



Example of a VMS Display

This message is provided by Variable Message Signs (VMS) located in appropriate locations positioned in advance of the exit point to the alternate route.



The information provided allows a driver to make an informed choice as to the route to be taken to his/her destination.

The alternate route, in this case, is via Athy (M9, N78 and N80). Messages are displayed on approaches to alternate routes in both the Dublin-bound and Limerick-bound directions (i.e. in advance of the N7/N8 and N7M9 junctions respectively)

Once an alternate route is taken, associated signposting, will guide the driver via a series of yellow "diamonds" until rejoining the standard route

Traffic loops located at Athy, also allow the system to monitor traffic volumes on the alternative route so that suitable messages can be displayed for road users on at the decision points. This helps to ensure that congestion is avoided on the alternate route.

The whole system is controlled and monitored centrally. It is intended that information from the "alternative route" system will also be available over the internet.

Jack Lynch Tunnel

The Jack Lynch Tunnel, in Cork, has a basic Enhanced Message Sign System, informing approaching vehicles of lane closure, speed restrictions etc.

The environment within the tunnel is continuously monitored for both traffic control and safety reasons. Any traffic congestion or incident activates warning signals in the tunnel management building situated at the northern side of the tunnel.

The monitoring, safety and emergency systems are connected directly to the Garda Síochána regional control centre and the fire alarm system is linked to the Cork Fire Brigade central station to ensure an immediate response to any emergency situation.

These essential communication links are by way of fibre optic cables, routed separately between the tunnel management building and the city centre, thereby ensuring protection in the event of any accidental damage. Where necessary, traffic can be directed to share one bore - or the tunnel can be closed completely - by way of variable message signs on both approach roads.

The tunnel is equipped with a total of 18 closed circuit TV cameras: four in each traffic bore, eight in the central service/emergency escape passage and one at each portal. The pictures are relayed to the nearby tunnel control room and also to the Garda control room in the city centre. Emergency panels are located every 50 metres. The panels are electronically monitored and when one is opened the nearest CCTV camera can zoom in on it within seconds.

The tunnel is also equipped with a vehicle detection system. In addition to providing usage statistics, this system can determine the average speed of traffic through the tunnel and alert controllers to vehicles travelling excessively slowly or even stopped.

Current ITS Projects

The NRA is currently participating in a number of ITS projects

M50 Motorway

In line with the M50's strategic importance with respect to the national road network, a number of associated ITS projects are currently being undertaken on the M50. These include:

SCATS

Sydney Coordinated Adaptive Traffic System (SCATS) is an intelligent transport system that monitors traffic flow 24 hours a day, adjusts the timing and coordination of traffic signals and reports signal faults. SCATS helps minimise traffic congestion to achieve the best possible traffic flow for all conditions.

SCATS is used widely throughout the Dublin City centre area and beyond and is a fundamental tool for the management of traffic by Dublin City Council. As part of the strategy to further integrate traffic management in the Dublin area, the NRA and Dublin City Council have agreed to extend the current SCATS system to the M50.



Dublin City Council Traffic Control Centre

Through the implementation of fibre-optic communications along the M50, Dublin City Council will be able to monitor and control traffic behaviour at each grade separated junction along the motorway.

SCATS automatically adapts to changing traffic demands by adjusting the green time available for each traffic movement at individual intersections. SCATS also provides coordination between intersections along major routes to reduce congestion and promote traffic flow.

Vehicle sensors located in the road surface at intersections register traffic demand information at the local traffic signal controller. This information is relayed to the Traffic Control Centre to inform management decisions on the coordination of traffic flows.

Example Tunnel Closed EMS

CCTV Monitoring

In conjunction with Dublin City Council, the NRA is currently installing an array of Closed Circuit TV (CCTV) cameras at each junction along the M50 Dublin C-Ring. The live images will be monitored in Dublin City Council's Traffic Control Centre and will be used to manage traffic on the M50 and the national arterial routes radiating from it thereby also helping to regulate traffic conditions and behaviour on other parts of Dublin's road network



Traffic CCTV Camera

The installation of CCTV cameras on the M50 will compliment Dublin City Council's increasing array of existing CCTV cameras and traffic monitoring technology throughout Dublin's City Centre.



CCTV Web Capture

Automatic Incident Detection M50

The NRA, in partnership with Dublin City Council, is also piloting the implementation of an Automatic Incident Detection System on the M50. Through the monitoring of traffic loops and static CCTV, the system will be able to monitor traffic flow patterns and be able to identify incidents (e.g. dramatic increases in congestion) quickly, thereby enabling a more efficient and appropriate response.

Emergency Phones

As part of the building of the M50 "Southern Cross" section, an innovative hi-tech motorway SOS phone system has been deployed along this new section.

Using VoIP (Voice over Internet Protocol) technology for the transmission of voice, the system offers a hands-free user interface to the road-side user. That, with the implementation of a patented Voice Clarity Enhancement (VCE) technology, facilitating much clearer two-way communication, gives the newly deployed SOS phone system a clear state-of-the-art feel.



STREETWISE

STREETWISE is an EU-funded project and is one of 6 European Projects administered under the EU's Trans-European intelligent transport systems PrOjects (TEMPO) programme.

STREETWISE aims to promote a Seamless TRavel Environment for Efficient Transport in the Western Isles of Europe.

The NRA's partners in STREETWISE are the Department for Transport (UK), Highways Agency (England), Scottish Executive, Welsh Assembly Government and the Northern Ireland Roads Service. The project is to run over the period 2001-2006. Its objectives are to support traveller information requirements on the multiple routes between Ireland – UK and Europe.

A number of projects within STREETWISE are being undertaken through a coordinated approach between the STREETWISE partners.

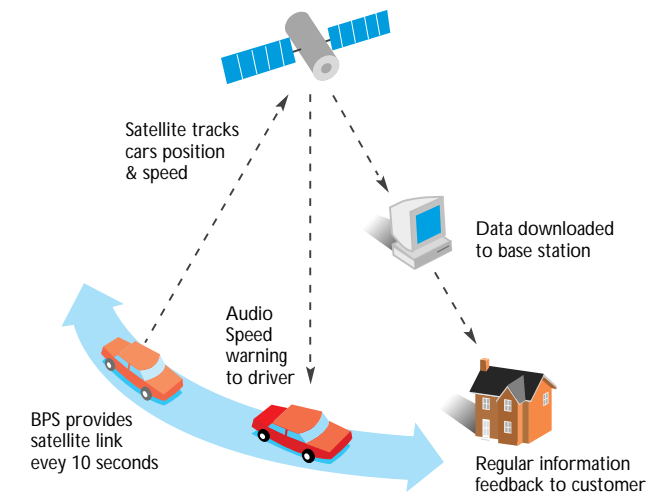
The NRA, through STREETWISE coordination is under taking the following projects:

Journey Time Estimation

Travellers wish to know how long their journeys will take. This is not easy to ascertain for some modes of transport, particularly private vehicles. However, technological developments in the area of Global Positioning System (GPS) data has prompted the NRA to investigate a means of journey time estimation.

Insurance company AXA, in conjunction with their brokers have piloted a scheme based upon the voluntary installation of GPS units into private vehicles in order to track their location and speed.

The system being used can keep a record of a vehicle's position at any given time, thus providing the essential data to provide journey time. This information is to be utilised by the NRA to calculate journey times. Ultimately a series of Journey Time data, based upon different origins and destinations, times of the day, week or year will provide invaluable information that can be fed back to travellers either as historical information or in real-time.





Freight/Fleet Management Study

Ireland's economy is heavily dependant upon the efficient distribution of freight both within Ireland and through its borders and seaways. The NRA has undertaken a study to establish what ITS implementations would be beneficial to this specific area of transport.

Recommendations to this study included the need for high quality traffic monitoring with a dedicated dissemination of traffic information to the freight user. The NRA intends to start implementations in this area during 2003 in partnership with the freight industry.

Traffic Data Exchange

In a world that is rapidly increasing its ability to collect and process information/data, STREETWISE is committed to exploring and implementing all possible practical means in which that information can be shared or exchanged with other road authorities, in a reliable and efficient manner in the interests of efficient management of transport systems.

The means by which information/data is exchanged is still evolving as new technologies emerge. The NRA, as part of STREETWISE (and INSTANT), intends to pilot a number of data exchange protocols between itself and other institutions within and outside the Republic of Ireland.

INSTANT

The National Roads Authority in the Republic of Ireland, together with the Department of Regional Development's Roads Service in Northern Ireland has examined the potential for providing Intelligent Transport Systems on the Dublin-Belfast corridor. Financial assistance has been secured from the European Union



The project acronym is INSTANT (Information and Management System for Multimodal Transport in the Republic of Ireland and Northern Ireland)

INSTANT is multi-modal in its outlook, considering both rail and road travel. It has identified appropriate network management tools to the NRA and Roads Service for the existing and planned road infrastructure between Dublin and Belfast.

The vision for the INSTANT project is to develop an ITS infrastructure using the best appropriate technology such as Enhanced Message Signs (EMS), Variable Message Signs (VMS) Radio Data System – Traffic Message Control (RDS-TMC), mobile phone technologies and the Internet.

A Feasibility Study was completed in 2002. The study made a number of recommendations for ITS deployments along the corridor. It is intended to commence a Design Study, with an objective to deliver short-term projects including the following:-

- Specification and installation of ITS infrastructure at key locations along the Dublin-Belfast route.
- Web portal for traveller information along the corridor.
- Exchange of data/ information between traffic control centres in Dublin and Belfast.
- A Travel Information Radio System along the corridor

An ITS Vision for the Future

Immediate plans, largely through both the STREETWISE and INSTANT projects, are to achieve a gradual implementation of proof-of-concept ITS solutions throughout the National Roads network.

Ultimately it is expected that, through the integration of such ITS implementations, a National Traffic Control Centre will be created to monitor and manage the national roads network. To assist with the safe and efficient management of the roads network are:

Examples of the types of implementations likely to be piloted over the coming years:



Electronic Fee Collection (EFC)

EFC already exists in Ireland as part of the EazyPass system on the West link and East link toll plazas.

However, in line with the NRA's proposed PPP managed road building projects, it is likely that a standardised form of electronic fee collection may ultimately emerge. This would, potentially, allow users to travel through multiple toll plazas without the necessity of carrying a multitude of sensors/transponders, etc.

Traveller Information Systems

A significant part of ITS applications are solutions that disseminate the necessary information to the traveller in a quick, efficient and safe manner. Traveller Information Systems take this form and cover both pre-trip information (internet route planners) and on-trip information (In-Car route guidance, RDS, Highways Advisory Radio, roadside VMS, etc)

In-Car

In-car navigation systems can provide, in principle, customised real-time route guidance to the driver.

Variable Message Signs (VMS)

Variable Message Signs are an extremely useful way of conveying important travel information to the driver, and consequently are a useful tool, amongst road network administrators, for managing traffic behaviour. The NRA already uses VMS in certain standalone locations, but now is planning a more integrated approach.

The NRA (in partnership with Dublin City Council) intends to install an integrated array of VMS signs along the M50, with the intention of managing traffic congestion and behaviour through travel information services.

Highway Advisory Radio (HAR)

HAR is the use of a dedicated radio frequency to issue traffic information to the road user. Through the INSTANT project it is intended to research, implement and maintain a dedicated HAR along the Dublin-Belfast corridor. Dublin City Council already successfully piloted a form of HAR within the Dublin area.



The Vision

The NRA recognises the importance of ITS as a tool to improve the efficiency of the road network with important benefits for the road user.

Through EU-funded projects, such as INSTANT and STREETWISE, and the continued development of major roads building projects, such as the M50, N1 and Dublin Port Tunnel, the National Roads Authority sees ITS as an essential component of all road building projects where traffic volumes warrant.

This strategy will help make Irish roads more efficient, more environmentally friendly and safer than ever before.

