

# 19

## chapter 19 Technology for traffic management

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## 19.1 Vehicle detection, location and control

Advances in technology have led to the development of affordable and reliable equipment that can improve vehicle detection, location and control, to aid the management of traffic.

Vehicle detection systems have been in common use at traffic signals and car park accesses for many years. Technology to selectively detect particular types of vehicles such as buses and emergency service vehicles using roadside equipment linked to signal controllers or a central UTC system (Chapter 10.11) is improving in reliability and accuracy and is becoming more widely used. This will give traffic management engineers greater scope for control of vehicle movements with a minimum of enforcement resources.

Global Positioning Systems (GPS) are now readily available for motor vehicles. In private cars they are most often used as part of in-car navigation systems, often to help drivers avoid traffic congestion. It can be used by organisations to keep track of vehicle positions and assist in planning routes for pick ups or deliveries, for security/monitoring purposes and to locate accidents or other incidents accurately.

Public transport vehicles equipped with GPS can be linked to real time information systems and offer up-to-date information on arrival and journey times. GPS fitted to Emergency Service Vehicles can assist in route planning to emergencies and give accurate positional information for summoning assistance at the scenes of crimes or traffic accidents.

Technology can help to support access restrictions to certain classes of vehicles (such as general traffic) and allow access by public transport or emergency services. It can help to reduce both the resources needed to enforce restrictions and concerns about abuse of the restrictions. Where traffic restrictions are given backing by physical measures such as rising bollards or barriers, emergency service vehicles, buses, etc. can gain access by a variety of means that activate the control feature, such as:

- on-board electronic devices
- card keys



Selective vehicle detection



Rising bollard to restrict access

Another form of access control is the use of queue management or "gating" techniques at traffic signal installations. Signals at pre-selected cordon points can be used to hold traffic queues to ensure the road capacity of an area is not exceeded. This filters traffic into an area to discourage the use of that road link or area by traffic at certain times of the day or year. The reasons for this can relate to air quality management or to congestion reduction in sensitive areas or along sensitive routes. These queues can be bypassed by buses and Emergency Service Vehicles if bus lanes, QBCs, or other special access lanes are provided on the main road.

Trials are being undertaken to test systems for in-car speed limiters linked to engine management systems. Such systems can either advise drivers of the need to reduce speed or automatically reduce or limit speed in response either to roadside equipment or global positioning information. Such technology could also assist in reducing incidents such as trucks hitting low bridges or enforcement of width and weight restrictions. Some of the applications would require action or legislation at European level.

Ramp metering (often using traffic signals) is a form of access control, which seeks to regulate the flow of vehicles onto a length of road, such as a motorway, in congested conditions. The aim of this is to smooth the flow on the motorway and prevent congestion or the normal flow of traffic from breaking down.

Road Pricing Systems (RPS) such as road tolls and or congestion charging systems are another form of access control. Tolls are limited to specific roads at present but their development and use may become more widespread as congestion increases and real public transport alternatives become more widely available. Several cities in the world have already introduced RPS to limit access to central business districts or to discourage drivers from taking their vehicles on to Motorways at peak times. Electronic

charging techniques have been developed to make the installation of RPS easier to install and manage. The introduction of such techniques requires new legislation and a political will to tackle the issue.

## 19.2 Variable Message Signing

The technology for Variable Message Signing (VMS) has been around for many years. Signs directing people to car parks are one of the most common uses of this technology. More recently advances in telematics linked to a control room with incident management systems and computer traffic prediction models, has led to an increase in the number of these signs on motorways across Europe. They can give advice for example on:

- driving conditions such as adverse weather
- alternative routes
- advisory/mandatory speed limits
- congestion ahead
- special events directions
- major accidents
- roadworks or lane closures
- journey time information

## 19.3 CCTV Surveillance

Closed circuit television (CCTV) is a useful tool for the surveillance of traffic conditions at key or congested junctions and usually forms a part of the equipment in use at traffic signal control centres. It is also in widespread use for security monitoring of public roads in shopping and business districts where it has proved successful in deterring street crime and car theft or vandalism as well as improving people's perception of personal safety.

CCTV can also be used to improve security at car parks, tollbooths, bus and rail stations as well as less busy areas where vulnerable road users could have

security concerns. These include remote bus and tram stops, subways, Park and Ride sites, etc. CCTV installations can also be used to monitor access controls, traffic lanes restricted to certain classes of vehicle (QBCs, bus lanes, etc.) and other more general traffic restrictions which would otherwise require a high level of enforcement activity.

Number plate recognition techniques using cameras linked to computer analysis packages can now provide a number of opportunities to help manage traffic:

- measure average speed between two points for enforcement of speed limits
- determine origin and destination information relating to vehicle routes
- improve enforcement of traffic restrictions
- by use with speed cameras
- assist with automation of toll collections

## 19.4 Automatic Debit and Pre-payment Systems

These systems have been developed to collect toll or other charges such as car parking fees without requiring drivers to stop. In traffic management terms, the main benefits of such systems are to speed up the collection of fees and minimise delays and congestion.

The most common applications are for tollbooths on motorways, tunnels and bridges or for the collection of parking fees.

However, they can be applied to road pricing and congestion charging schemes.

The simplest systems use a "smartcard" which is manually inserted into a barrier machine and either debits an account held with the operator or uses up prepaid units held electronically on the card. In more sophisticated systems the vehicle either has a "smartcard" mounted in the window which can be read by external electronic equipment, or they have an internally mounted electronic device which triggers a signal that can be read by the external equipment.



Variable message sign



CCTV at traffic signal junction

## 19.5 References

1. Intelligent Transport Systems – Realising the Potential  
Proceedings of Conference held on 5th & 6th November  
2002 available on cd from Office of Director of Traffic,  
Dublin City Council, Civic Offices, Dublin 8. Telephone 01-  
6722592