



AUTOMATIC VEHICLE MONITORING

One of the main goals of public transport network operators is that of providing the public with a reliable and wellplanned service that offers a viable alternative to private means of transportation.

Among the key requirements for the accomplishment of this goal are the quality of the service, the provision of clear information to the public, optimised management of vehicle fleets and correct scheduling of route timetables. CITIESavm (automatic vehicle monitoring) is designed to manage a surface fleet based public transport network in a simple and effective manner.

This application is composed of two main modules, CITIESfm (fleet management) and CITIESdm (depot management). It can also be connected to the other components of the CITIES suite (such as CITIESvisor for on-board video surveillance and CITIESutc for management of the traffic lights system) and integrated with client applications.

ARCHITECTURE

The system is based on distributed, flexible and robust architecture with the following components:

- Operations Centre, in which data from depots and vehicles are processed in such a way as to monitor the service in real-time, detecting delays with respect to timetables, checking operative and out-of-service vehicles in each depot and analysing imagery from on-board video surveillance cameras
- Depots, in which equipment for fleet management and tracking are installed
- Intelligent peripheral systems:
 - On-board systems, comprising an intelligent unit equipped with sensors, cameras, GPS, information panels for passengers, driver touch-screen terminal and voice and data connection to the operations centre
 - Information kiosks/posts at stops, providing the public with details of timetables, waiting and journey times and various service information
 - Depot systems for fleet detection and tracking

FLEET MANAGEMENT

The CITIESfm module installed in the operations centre provides the operator with the full range of functions for monitoring, planning and communication required for the management of a modern public transport network. Service planning data (routes, lines, journeys, vehicle shifts, and so forth) can be transferred completely automatically from the operations centre to the vehicles, and vice versa, all the data gathered during the service can be transmitted from the vehicles to the operations centre.

The CITIESfm module makes it possible to identify (with the aid of the odometer and compass for areas without mobile network coverage) the precise position of the vehicles in the fleet in real time, provide information on their operational status, manage fare collection equipment, provide a GSM/GPRS voice/data connection, allow the transmission of information to the public at stops (on information posts) or on board (scrolling message panels on board the vehicle), and save all the data collected from the vehicles. Communication with drivers is achieved by means of an advanced terminal in the cab, equipped with a touch-screen display, speaker and microphone.

This terminal allows the driver to communicate with the operations centre or transmit information (maintenance request, ambulance request, accident reports, etc.) simply by pressing an icon on the screen.

The vehicle can be equipped with up to 4 scrolling message panels showing route number, vehicle terminal destination, current stop and next stop, with a corresponding spoken message. The intelligent on-board system can calculate the current stop and the next stop by interrogating the GPS system and interacting with service programming data.

The system also makes it possible to implement a service that counts the numbers of passengers boarding and alighting through each of the doors at each stop. This provides the data required for analysis and generation of statistical reports on passenger flows.

DEPOT ACTIVITIES MANAGEMENT

The CITIESdm module provides the facility to track, log and display all movements of vehicles in the depot, from the time of their arrival to the next departure, following them in physical terms ("localisation") and in logical terms ("operative status"). Physical localisation produces real time information on the exact location

of the vehicle (parking bay, washing bay, maintenance shop, refuelling bay), while management of the vehicles operational status shows whether the status of individual buses is "in service", "service completed", "depot operational cycle", "maintenance", and so forth.

Operational cycle management also makes it possible to check whether routine depot activities (refuelling, washing, parking in bay etc) have been effectively performed. Additional functions performed by the module include management of routine and reactive maintenance and service programming (management of shift/unit - vehicle, shift/unit - operator/depot, shift/unit - driver). Depot staff and drivers can access the service programming system by means of information kiosks, displaying their shift information and entering holiday or shift change over requests.

