Dublin Tackles Bus Performance Using Virtual Detection Zones

Trevor Platt, BD Manager at Nicander Limited, gives an overview of the recently installed SCATS Virtual Bus Priority and Information System for Dublin City.

Most councils face significant challenges with regards to monitoring the performance of their public bus transportation services and resolving problem areas along routes. Focusing on these issues, Dublin City Council has successfully built on its existing infrastructure of ITS applications and tackled this head on with a solution they believe is a 'best-fit' for their budgets, requirements and operational targets. Initial data analysis has shown significant improvements in journey times and Dublin believe this is set to continue.

Background

In Dublin City, day to day traffic management is provided via SCATS (Sydney Coordinated Adaptive Traffic System). The main mode of Public Transport is by bus and the main operator is Dublin Bus, a State owned company with a fleet of over a 1,000 buses, most of which terminate in, or pass through, the city centre area; real-time passenger information is delivered through a GPS-based bus tracking solution (AVLC) and information signs to display next bus information. These solutions are commonplace throughout the World.

Solution

Dublin City Council (DCC) has designed a selective bus priority solution that utilises their investment in SCATS and AVLC to deliver selective priority services without the need for additional roadside infrastructure. Priority schemes typically require roadside devices to instigate priority, but the Dublin system uses a centralised software solution that establishes virtual detection zones across the City to effect priority based on defined parameters.

SCATS incorporates an API allowing external applications to interface with traffic signal operation. The Dublin Bus AVLC management system provides a SIRI VM data feed which contains the position of each in-service bus in the fleet at a polling period of approximately 20 seconds. Data on whether the bus is in congestion, free-flowing or loading passengers at a bus stop is also contained in this data feed.

The new Dublin Public Transport Interface Module (DPTIM) bridges the gap between SCATS and the Dublin Bus AVLC management system by integrating these systems through a specially designed and low cost software solution implementing traffic signal priority for the City's bus network.

The new software solution for DPTIM processes data inputs and outputs to/from bus feeds to SCATS. It accommodates a comprehensive database management system for processing data received from the buses and stores and manages a geospatial information system that permits map-based displays to be provided.

The map-based user interface displays the latest status of the locations of the public transport vehicles by mapping the real-time SIRI VM data feed. The application provides a drawing interface which allows the user to map out virtual detectors to be used as hot-spots and detector points within the road network. These virtual detectors can be configured for specific route/journey patterns with individual threshold values. Such thresholds can include, for example queuing time, the number of buses located within the geospatial area of that detector, or an acceptable journey time. Should the real-time values of these thresholds be breached, then the application calls a command on the SCATS/API. The execution of priority commands uses a number of different ITS port functions (Action Lists, Dwells) and manages detector behaviour at different time-of-day periods through a programmable scheduler.

Results

Since implementation, DPTIM has produced significant improvements in average journey times which is easily quantified using the system's reporting function providing access to, and analysis tools for, collected data. All information is recorded and events and route performance can be reviewed at any time using the simulation mode. The new DPTIM application delivers a centralised network response to bus problem locations, not just an individual junction response but to corridors and city-wide routes via multiple junction adjustments.

Benefits

The benefits being delivered to the Authority, bus operators and travellers throughout the City of Dublin include:

Improved Efficiencies

- DPTIM has achieved its main purpose of helping Dublin Bus deliver a reliable, efficient service to all of its customers

- Operationally, the new DPTIM, with its faster updates, enables greater visibility of issues on the roads. Combined with the CCTV system DPTIM users are able to use this information to detect serious incidents on the network and react accordingly
- Average Queue times have significantly reduced, particularly during peak periods, resulting in shorter journey times for passengers

Sustainability

- By increasing the potential number of bus users with access to the city there is an expected benefit to the commercial and retail sectors in Dublin. This will help drive investment, sustainability and economic growth in the city
- With smart vehicles able to capture more information such as passenger count, energy consumption and improved communication means, this will support new cooperative ITS solutions; this project has initiated new discussions, views and requirement awareness in the area of Smart Cities and Big Data for all stakeholders with a common objective of delivering continual improvement in sustainable transportation

Reduced Costs

- The use of a standard SIRI interface to obtain the data generated by existing AVL infrastructure installed by Dublin Bus which provides a significant cost saving
- DPTIM is able to use DCC's existing SCATS traffic signal control system to affect bus movements into and out of the city
- More efficient bus routes reduce operational costs
- No extensive civil works required

Environmental Benefits

- DPTIM helps DCC to achieve their objectives to reduce congestion and safer roads
- Buses flowing freely and not queuing, enhances the ambience in areas of the city where queues and congestion occurs
- Increased efficiency of public transport through DPTIM encourages more bus users with reductions in the number of cars travelling into the city

Operational Service Improvements

- Faster status information on all buses including real-time 'in congestion status
- Map-based and colour coded display to assist operator intervention
- Geospatial monitoring of occupancy, journey times queuing etc.
- Ability to alleviate 'bus bunching'
- Opportunity for complete corridor analysis