

# NETWORK MANAGEMENT DATA ACQUISITION AND ANALYSIS

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## Abstract

Acquisition of real data from the road network allows network operators to review and model capacity. Modification of the real data based on data from incidents and events on the network offers a route to understanding the limits and elasticity in the network and thence the development of strategies to optimise network operation when events occur.

## 1. Outline

The Traffic Management Act has bestowed on local authorities certain duties and powers appertaining to the management of their highway networks. Although daunting in its enormity the Traffic Management Act brings with it many opportunities to empower local authorities to better manage their networks through documentation, strategic planning, coordinated street works, enforcement and network operational statistics.

This paper outlines one company's approach to delivering the aspirations of a local authority's ambitious vision of network performance assessment.

## 2. Background

telent Traffic Signals has developed STM, an innovative system for the network management sector which covers traffic data collection, assessment and strategic control deployment.

Southampton City Council's Traffic and Network Manager Vijay Manro has installed STM at the City's prestigious ROMANSE Traffic and Travel Information Centre in order to provide strategic network capacity assessment and traffic management metrics.



Figure 1 The Southampton Romanse Control Room

Southampton has a long history of innovative ITS development and deployment working in conjunction with the DfT, Southampton University, European research partners and manufactures.

The Southampton City Council highway network can be seen in the picture below which also includes a section of the Highways Agency motorway network.

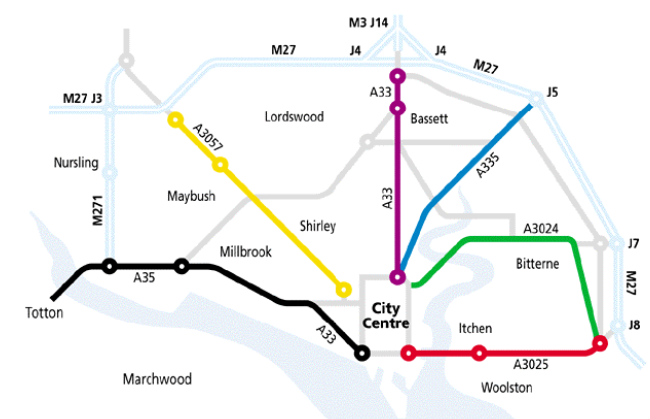


Figure2 Map Of The Southampton Network

### 3. The Software System

STM is an open architecture system able to communicate with a range of other systems typically found in the modern day local authority traffic control room. At the core of STM is an SQL database capable of the storage, retrieval and manipulation of the data made available to it. It has been deployed in Leeds and Sheffield where it is being used to good effect to provide alternative strategies for signal controlled junctions that are on priority bus routes (1-4). More background to STM can be found on the UTMC web site (5).

At Southampton the STM software is installed on a Linux server and is initially communicating with the City's Urban Traffic Control System.

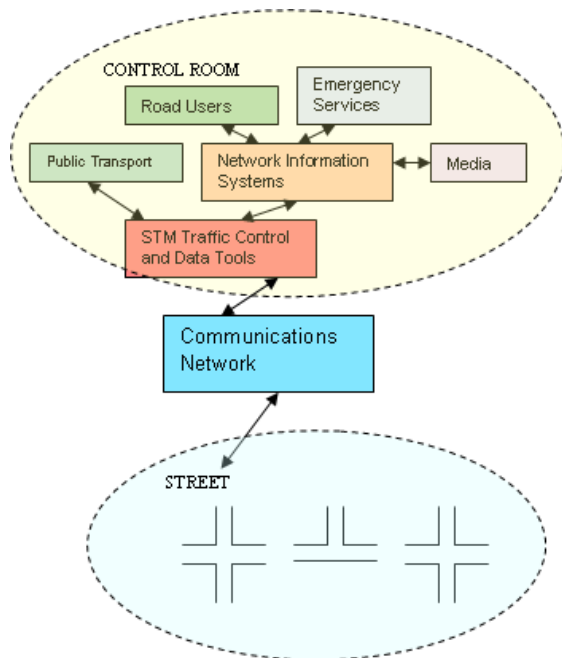


Figure 3. Graphic Of STM In A System Context

### 4. Data Collection

Through the connection to UTC the STM software derives such network metrics and data as vehicle flow, lane saturation, intersection to intersection distance, calibrated saturation occupancy, traffic signal timings and queue indication. This data can then be analysed and smoothed if required using standard deviation techniques.

Data is currently being collected over an initial three month period which will allow preliminary assessment and mathematical smoothing to begin.

### 5. Data Manipulation

The STM software then applies a series of mathematical functions to the data in order to derive certain base values about the traffic signal controller network. Further computation of the data can then be used to calculate baseline values for give way intersections using gap acceptance ratio criteria, etc. and thus we rapidly have a mathematical picture of the main routes with in the city.

Further manipulation of this data is then possible to assess the impact of capacity reduction within these strategic areas of the network. It is possible to then start the process of evaluating the likely effect road works or diversions may have on these key routes. This subsequently assists in the delivery of network management duty. The output is further enhanced with the ability to quantify the data collected and assessed from the network which has currently not be available for automatic assessment by the network management team.

### 6. Future Aspirations

Southampton does not want to stop at just assessing its networks capacity it wishes to analyse the possible strategic options available to it in managing the network.

Through the existing data gathered and links to systems such as bespoke roadside data acquisitions models currently in development and journey time estimation software it hopes to be able to use a combination of micro, macro and meso simulation to further evaluate the operation characteristics of its network.

**telent** Traffic Signals are currently developing a facility within their STM software to play back the collected or analysed data to drive simulation tools. STM also has the capability to take control of signalised intersections and therefore can do so in the simulated environment. Strategic plans can be tested on real life captured data allowing lessons to be learnt and better strategies to be deployed for subsequent similar events.

It is further hoped that through the use of mathematics, trend analysis and such methods as augmented flow theory we can even start to understand the nature of user determined diversions caused by the event of incidents and irregular congestion within the network.

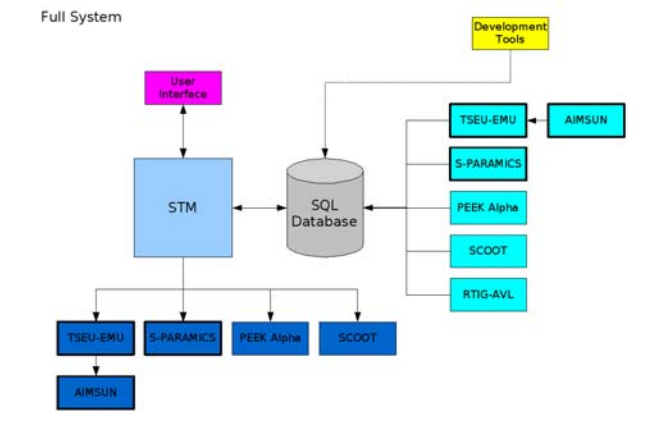


Figure 4 Graphic Of STM System Architecture

## 7. Conclusion

As we enter an era of more strategic network control where the car may no longer be the highest priority on the highway network making way for more sustainable forms of transport such as cycling and public transport so the shape of

our policy's are also changing with emphasis being placed on congestion, environmental management and journey reliability it is then fitting that we begin to embrace new products and approaches to the operation of our highway networks. This can only advance when the right information gathering tools are available and are applied to the problems that Network Managers are working to overcome. At Southampton we are starting this journey by exploring the potential of integrated system approaches, data acquisition and analysis.

## 8. Bibliography

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