PROACTIVE NETWORK MANAGEMENT IN THE SOCRATES$^{2.0}$ PROJECT

NETWORK MANAGEMENT

One of the SOCRATES$^{2.0}$ goals is to be more proactive in traffic management in public-private collaborations. Deploying traffic management services more proactively can delay or prevent congestion. The longer traffic can maintain a near maximum speed, the longer the 'capacity drop' can be delayed, which in turn improves network capacity and thus performance. The capacity drop occurs after congestion and can cause up to a 25% loss of capacity on motorways. The effect of this phenomenon is more congestion, less safe conditions for road users and more polluting emissions. So the main objective is to avoid or delay the capacity drop at a network level.

This can be accomplished by 'load balancing', the principle of preventing overload on a route in the network while leaving sufficient capacity on other alternative routes in the network. SOCRATES2.0 developed the Network Manager, a new intermediary role, for this very purpose. It is a fully automated system under the responsibility of one or more partners. The Network Manager can send out service requests to rebalance the traffic load on the network.

KEY PERFORMANCE INDICATORS

The Strategy Table defines production as a KPI to maintain high network performance in terms of speed and flow. At a more operational level, production is translated into 'levels of services' (LoS). It is also possible to define emissions and liveability as a strategic KPI, such as in the Optimizing Network Traffic Flow (ONTF) use case in Copenhagen.

LEVELS OF SERVICE

Six different LoS can be defined to express a traffic state for different links, as can be seen in the speed flow curve. It is defined as a curve with decreasing speeds and increasing and decreasing flow.

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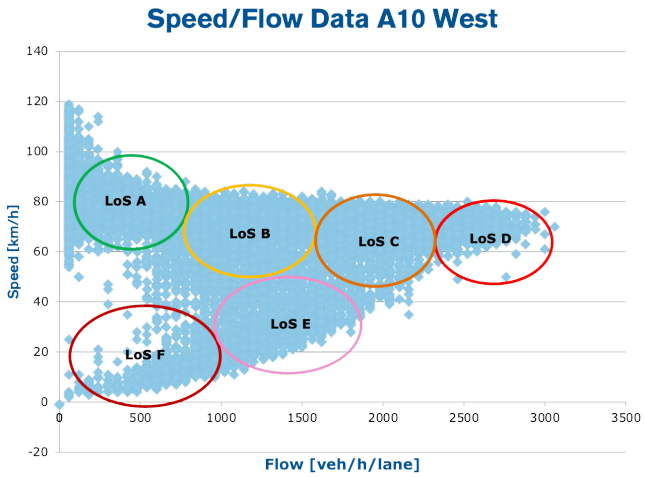


Speed/flow data categorized into 6 different traffic states

On motorways, in LoS A through D, speed is near maximum (80 km/h), but flow increases from 0 to approximately 2500 vehicles/hour/lane. Speeds near capacity, which can be found in LoS D traffic states, have a high chance of collapse of network performance, causing speed to approach 0 and transitioning into LoS E and F, which are congested states that should be prevented. Note that the use of flow data or volumes (vehicle per hour per lane) on motorways is more important than speed data for pro-active traffic management.

The LoS concept can also apply to urban environments. However, travel times and queue lengths are better indicators of LoS. The main goal in an urban environment is to prevent spillback to upstream intersections, which can lead to gridlock in the worst cases.

PREDICTION IS NICE TO HAVE

If an undesirable LoS is predicted, but not currently happening, service requests can be deployed before the problem state arises. In the example above, LoS D, E and F can be seen as undesirable because they are unstable or congested traffic states. In this case, prediction buys the Network Manager time to deploy a service earlier than an operator or service provider currently would.

Prediction for large-scale road networks is still challenging, but also promising. Although pro-active traffic management is still possible without prediction.

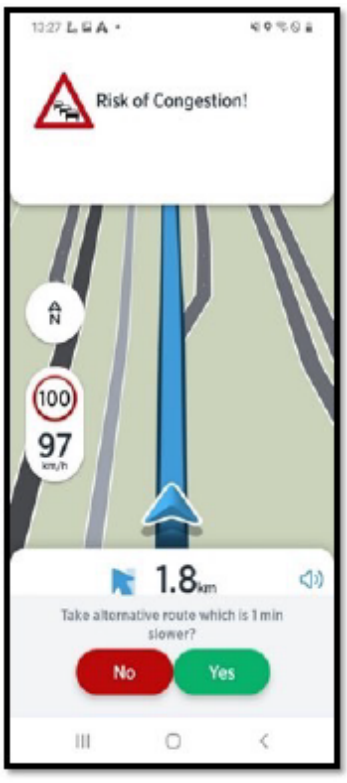
ROLE OF SERVICE PROVIDERS IN PRO-ACTIVE TRAFFIC MANAGEMENT

Service providers have services that can be used to target individuals, as opposed to road authority instrumentation such as route information panels and traffic lights. Service providers also have the capability to send more detailed messages to their individual users, such as risk of congestion.

Service provides can help achieve public goals, in this case an optimal network performance. This creates business opportunities for service providers and a more efficient way of conducting traffic management for road authorities. In the example below, an end user is prompted to take an alternative route in order to help prevent congestion.

FOCUS ON THE END USER

Network management can also cover multiple modes of transport. It is possible to view the road network, public transport network, as well as the MaaS network, as one network. An overarching Network Manager is needed to keep an overview of and manage different types of networks. The Smart Destination use case (at the ArenA area in Amsterdam) optimises both the road network as well as parking and walking.



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