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**On Modifications to the Traffic-Responsive
Urban Control Method**

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Abstract

The current work has its focus on further improvements envisioned for an existing traffic control system called Traffic-responsive Urban Control (TUC). Originally conceived for corridor networks, TUC only offers the possibility to maintain synchronized traffic lights that give right-of-way for the vehicles traveling through the main routes or, more specifically, the routes that do not intersect. This synchronization is achieved through the adjustment of the Offset parameter, and it is known to avoid unnecessary stops at the successive traffic controlled intersections, reducing traffic delays and increasing the drivers' comfort.

The present investigation proposes an extension to TUC's original formulation, enabling it to handle more complex networks (meshed networks), where the secondary intersecting routes may also profit from traffic lights synchronization. Moreover, TUC's original method, employed during the necessary changes in Offsets, is also improved. The new method takes into consideration the impacts that the change in Offsets may incur to the operation of the network.

TUC's main input information, during its operation, is the description of current traffic queue lengths. Complementing the mentioned modifications to TUC, a new method for the estimation/prediction of traffic queues is presented. The proposed Queue Estimator/Predictor uses a macroscopic traffic model to capture the traffic dynamics of the network, and uses this information for improving the traffic queue estimations calculated in a previous step.

Finally, the evaluation of the current developments is presented. The evaluation is carried out through the simulation of a real network during a whole day operation. The new developments are not only compared to TUC's original formulation, but also against a recently developed Adaptive Traffic Control System (ATCS) prototype. The results show that the developments proposed in the current work were indeed beneficial to TUC's operation, even though the improvements were not quite as high as expected.