Service-oriented cooperation policies for intelligent ground vehicles approaching intersections have been proposed in our work.

With the coming of intelligent vehicles and vehicular communication, Intelligent Transportation Systems (ITS) of connected vehicles are emerging and now evolving to Cooperative ITS (C-ITS), as service platforms for smart cities. Considering new service properties, the autonomous cooperation of such vehicles has exhibited novel QoS features that imply new requirements: guaranteeing the traffic efficiency of any emergent vehicle while trying to promote the throughput at an intersection. So, after analyzing the classic reservation-based cooperation mechanisms, new QoS-oriented cooperation methods and policies are studied in this work. Concretely, several models of related traffic objects are firstly introduced in brief. On this basis, two groups of fundamental policies are designed. The first focuses on scheduling vehicles with different priority criteria, covering the vehicular arrival-time, priority mapped to QoS, and the weight of a lane etc. The second mainly concerns to improve the traffic efficiency at an intersection via promoting the parallelism of multiple traffic flows, particularly, at any time scheduling a platoon rather than single vehicle or parallelizing traffic flows on different lanes. With these fundamental policies, five novel cooperation polices are then proposed and designed. All these policies and other three typical policies are implemented within our parameter-configurable traffic simulator QoS-CITS (v2.1) as shown in Figure 1.

![Figure 1. The Traffic Simulator QoS-CITS (v2.1).](image)

Based on abundant experiments, all these designs are verified with typical traffic parameters, and some valuable conclusions about the effect of these policies are finally drawn out. From this deeper study, we can conclude that queue-based QoS-oriented policies can guarantee both the traffic QoS of emergent vehicles and the traffic throughput. In particular, HWFP-SQ-SV and HWFP-MQ policies show better performances, which means that these policies are most
suitable for the C-ITS in a city.

**Keywords**

Cooperative ITS; Intelligent Vehicles; Intersection; Policy

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