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Q-OLSR adaptation for mobility in VANETs

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***Abstract*— In this paper, we tried to improve Q-OLSR in order to deal with mobility issues. Several previous works have tried to adapt OLSR to high velocity. To this end we analysed different approaches and evaluations of proposed solutions. Referring to those studies, we propose a new protocol called VQ-OLSR which is designed to meet both realism and computation simplicity requirements.**

I. Introduction

Q-OLSR[1] is a QoS extension to *Optimised Link State Routing* Protocol that designed for ad-hoc networks. Recent works demonstrates the insufficiency of OLSR and transitively Q-OLSR to support the high velocity challenge of VANETs [2]. VQ-OLSR (VANETs Q-OLSR) propose an adaptation of Q-OLSR for mobility in the context of Vehicular Ad-hoc NETworks (VANETs).

We first give a survey on the main techniques for adapting OLSR to the mobility. Then, we propose the principles of proposed VQ-OLSR. We finally conclude and present future work.

II. Mobility prediction techniques

In [3][4][5], authors focused on adaptation of OLSR to the mobility impacts. They propose many approaches based in general on two techniques. The first one is mobility metrics conception; it is based on computation and exchange mechanism of position, speed and direction information between nodes in order to quantify relative link stability. While the second one is the mobility prediction consideration for the MultiPoint Relay (MPR) selection algorithm optimisation.

PROTOCOLS	MOBILITY METRIC	MPR SELECT. ALGORITHM	MOB. MODEL	IMPROVE-MENT / OLSR
OLSR-FCT	X	X	SUMO	+++++
LS-OLSR	X	X	RWP	++
OLSR+LD	X *(LS-OLSR)*	X *(KMPR)*	RWP	+
OLSR-KMPR		X	STEADY STATE RWP	+++++

Table I. Analyse of mobility prediction techniques

Table I shows for each protocol the mobility techniques, the mobility models and the improvement compared to OLSR. These solutions are simulated using NS-2, with average density of 150 node/km^2 except for OLSR-KMPR which was simulated with 20 nodes/km^2. The evaluation metrics are the end-to-end delay, the PDR and the routing overhead. We note that OLSR-LD which combines LS-OLSR with OLSR-KMPR generates the weakest improvement compared to OLSR. We suspect that this degradation is due to the choice of RWP as mobility model because it is not realist enough to support VANET simulation. We can also note that OLSR-LD cumulates the complexity of the tow combined solutions.

III. Proposed solution

Our proposed solution VQ-OLSR is based on Q-OLSR multi-metrics and KMPR-OLSR.

Q-OLSR adopts a QoS heuristic named QH to optimise the MPR selection referring to four QoS computed metrics. While Kinetic MPR-OLSR uses relative location, velocity and direction of tow neighbours to let each of them predict their link duration. Then, we add this last information to the QoS metrics supported by Q-OLSR.

In this purpose, we concept a new heuristic named VQH in which we select MPR considering five QoS metrics and prioritising link duration metric. In addition to this, we used the NS-3 highway mobility model and different density configurations to simulate our solution.

IV. Conclusion and future work

As a result, we have explored the key ideas of Q-OLSR and OLSR-KMPR to meet mobility and realism requirements. VQ-OLSR is still being developed under NS3 simulator. In the future, we are interested to compare it with Q-OLSR when supported by NS-3 802.11p implementation.

References

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