A large-scale urban vehicular mobility trace for network research

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Vehicles are envisioned to become real communication hubs in the near future, thanks to the growing presence of radio interfaces on the cars as well as to the increasing utilization of smartphones and tablets by their passengers. Enhanced infrastructure-based systems, involving, e.g., WiMAX and LTE-A, and novel data transfer paradigms, such as, e.g., ad hoc and opportunistic networks, are being studied in order to accommodate the traffic generated and requested by forthcoming communication-enabled vehicles.

In such a context, simulation remains the mean of choice for the evaluation of large-scale deployments of new vehicular networking solutions. Notably, an ever increasing attention is paid to the faithful simulation of the unique dynamics of car mobility, as it is today commonly agreed that the high-speed, strongly-correlated and constrained movements of vehicles can dramatically affect the network performance.

The challenge lies in generating traffic traces that: (i) compass very large urban areas, i.e., whole cities including their surroundings; (ii) present realistic microscopic mobility features, i.e., that properly reproduce the movement of individ- ual drivers in presence of other cars, traffic lights, road junctions, speed limits, etc.; (iii) are realistic also from a macroscopic point of view, i.e., that faithfully mimic the evolution of large traffic flows across a metropolitan area over time.

Currently, the vehicular mobility traces that are commonly employed for the validation of network protocols and solu- tions are either realistic from a microscopic viewpoint, but limited to a small area and short duration [1, 2] or large-scale and accounting for macroscopic mobility, but lacking microscopic detail, in terms of traffic, time and space granularity [3, 4].

In this presentation, we introduce a novel realistic synthetic dataset of the car traffic over a typical 24 hours in a 400-km^2 region around the city of Köln, in Germany. We outline how our trace improves today's existing descriptions and show the potential impact that a comprehensive representation of vehicular mobility can have on the evaluation of networking technologies.

References

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