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Large-scale Coordinated Platooning of Heavy-duty Vehicles.

Heavy-duty vehicles traveling in platoons experience less aerodynamic drag and therefore consume fuel at a slower rate than when traveling alone. We present a coordinated approach for routing vehicles to minimize total fuel use (and thereby minimize their environmental impact). Though we show the general platooning problem to be NP-hard, we propose a heuristic based on local controllers placed throughout the road network that facilitate platoon formations with minimal information. By knowing a vehicle's position, speed, and destination, the local controller can quickly decide how the vehicle's speed should possibly be adjusted to platoon with others in the near future. We solve this optimal control and routing problem exactly for real-world scenarios. By implementing our distributed control system on a large-scale simulation of the German autobahn road network, we observe fuel savings ranging from 1-9%, with savings exceeding 5% when only a few thousand vehicles participate in the system. (Received September 11, 2013)