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Influence of queue propagation and dissipation on route travel times

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The representation of queue spillbacks in a congested network plays an important role in transportation network analysis. Dynamic network loading (DNL) models that are able to represent queue spillbacks suggest two approaches to represent traffic flow propagation. One is based on the kinemtic wave theory (KWT) and it is used in the cell transmission model (CTM) and the link transmission model (LTM). The other represents the dynamic queuing models (DQM) which are used in the state-of-the art dynamic traffic assignment (DTA) models and it is based on the idea of link representation through a queuing and a moving part. These characteristics enable both models to represent queues and their spillbacks, but also introduce a significant difference between them. Firstly, the KWT relies on the first-in-first-out (FIFO) rule, which means that models such the CTM and LTM cannot take multiple vehicle classes into account (Bliemer*, 2008*). Yperman *(2007)* indicates that there is a significant difference in queue-propagation and queue-dissipation between the LTM and DQM. This results in different route travel times, and can further affect route choice. In this paper, different approaches to represent queue propagation and dissipation through the CTM, LTM and DQM are studied. A simple network allows to show how these approaches influence route travel time. Furthermore, the possibility of changing the existing DQM is considered in order to more realistically represent queue propagation and dissipation, which would lead to more accurate route travel times.