USDOT Region V Regional
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NEXTRANS Presents a Seminar by

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Purdue University, Armstrong Hall, Room B061

A NETWORK MODEL FOR CAPPED DISTANCE-BASED TOLLS

Toll road operators and other toll facility stakeholders require analysis tools to estimate the ridership and projected income for an increasing variety of tolling schemes. Some tolling schemes commonly considered include distance-based tolls as well as derived schemes such as charging a maximum toll (or cap) for the use of the facility or minimum toll, if the distance-based toll is less than this value. In addition, different entry ramp tolls are considered, which may be added to a distance-based toll and additionally subjected to the toll cap value. In order to meet these requirements a new model formulation and algorithm for distance-based toll modelling is developed. It uses the toll cost per link, which may be distance dependent, together with minimum and a maximum value of the tolls paid. The model is based on the addition of a set of temporary links to the network, which inherit the tolls and the delays of the original links. The method presented in this paper is general and self-contained. A proof is provided for the equivalence of the modified and original network formulations.

This new method is illustrated with a small example and a case of capped distance-based toll modelling on a network originating from practice. In order to solve the resulting multi-class network equilibrium model, a multi-threaded bi-conjugate variant of the linear approximation method has been adapted for the particular toll structure considered.

Dr. Michael Florian is a professor at the Université de Montréal. He has published more than 150 journal articles on topics in transportation and operations research. He has served, or serves, as an associate editor or editorial board member for journals such as *Operations Research, Transportation Science, Transportation Research Part B, Regional Science* and *Urban Economics, and Transportmetrica*. He is an elected member of the Royal Society of Canada and the recipient of the Robert D. Herman Lifetime Achievement Award from INFORMS. He has also received several recognitions from Canada including the Jacques Rousseau Prize, R&D Council of Transportation Prize, and the Merit Award of CORS. He was awarded an honorary doctorate from the University of Linkoping and has been an honorary professor at Shanghai University of Science and Technology. Dr. Florian is the developer of the commonly-used EMME/2 transportation planning software, as well as that of STAN freight software; these programs have been used in 61 countries. He is the founder and president of INRO Consultants, Inc., and has been a consultant to over 60 organizations around the world. Dr. Florian received his doctorate from Columbia University in 1969.