

# **Two-layer adaptive signal control framework for large-scale dynamically-congested networks: Combining Max-Pressure and Perimeter Control**

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This work investigates the benefits of a two-layer adaptive signal control framework combining multi-region perimeter control (PC) with distributed Max Pressure (MP) control in selected network intersections. Motivated by MP's questionable performance in over-saturated traffic conditions and the importance of traffic homogeneity in the effectiveness of MFD-based PC, the concept of parallel application of the two strategies, acting in different network nodes but in a parallel scheme, is expected to increase overall system performance due to the controllers' complementary nature. A method to identify critical nodes for MP control is developed, in order to allow partial MP application in fractions instead of all network nodes. Modified Store-and-forward dynamic traffic paradigm is used to test different control configurations for a real large-scale network. Results show the combined scheme more effective compared to separate controller applications while MP node selection method appears capable of increasing MP efficiency and applicability.

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