

# A Polling Model for Traffic Junctions

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In this paper, we consider a polling model to minimize waiting time at traffic signals. This is done by regulating the time a signal remains in ON position using a random clock. Suppose that the signal is on for vehicles to move in a particular direction. Suppose that all vehicles in that queue have been served but time is left to go from Green to Red. In this case, the moment the last vehicle leaves with no vehicle in sight for service, a clock of random duration starts. This clock has a stochastically much shorter life than the residual time left for moving from green to red. If no vehicle comes for service in this queue during ON time of this clock, the signal is turned red the moment the clock realizes. Then the signal gets turned (Green) for the next waiting line(in a cyclic order). These modifications results in considerable reduction in traffic jams at junctions. This system is analysed as a continuous time Markov chain(CTMC).The different streams of arrivals to the junction form independent Poisson processes. Service time for customers is assumed to be independent exponentially distributed non-identical random variables. For analysis, we consider finite capacity of waiting lines. We employ matrix analytic methods for the analysis. Several performance measures are computed.

**Keywords:** Polling systems; Single-server multi-queue system; Matrix Analytic methods; Performance evaluation.

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