Comments and Corrections

Correction to “A Queue-Stabilizing Framework for Networked Multi-Robot Exploration”

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Section III-F in [1] made formal claims about the limiting behavior of the controller (as time and space grow to infinity) whose proof relied on a stochastic network optimization theorem which may not apply. Specifically, we cannot make the claim that the optimal value of $\overline{Y}$ achieved by a one-step local controller and the constraints on time-averages can both be achieved arbitrarily closely by the controller given by (16). This is because to prove this claim and demonstrate that this controller stabilizes all queues as $t \rightarrow \infty$, the theorem (see drift-plus-penalty method [2]) requires that at each time slot there exist a decision that causes the size of the virtual queues to decrease, or remain constant, in expectation. This requirement is not satisfied as the robot may reach a state where all possible actions increase the queues sizes. Note however that the claim that our controller will achieve a bounded queuing delay still holds in the more realistic context of finite time and/or space, and the performance gains of the proposed controller remain valid in practice.

References

[1] L. Clark, J. Galante, B. Krishnamachari, and K. Psounis, “A queue-stabilizing framework for networked multi-robot exploration,” *IEEE Robot. Automat. Lett.*, vol. 6, no. 2, pp. 2091–2098, Apr. 2021.

[2] M. J. Neely, “Stochastic network optimization with application to communication and queueing systems,” *Synth. Lectures Commun. Netw.*, vol. 3, no. 1, pp. 1–211, 2010.

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