

Algorithms for Consistent Flow Rerouting

Saeed Akhoondian Amiri, Szymon Dudycz, Klaus-Tycho Foerster, Damien Foucard, Arne Ludwig, Jan Marcinkowski, Matthias Rost, Stefan Schmid, Sebastian Wiederrecht, Stefano Vissicchio



Aalborg University, Denmark & TU Berlin, Germany

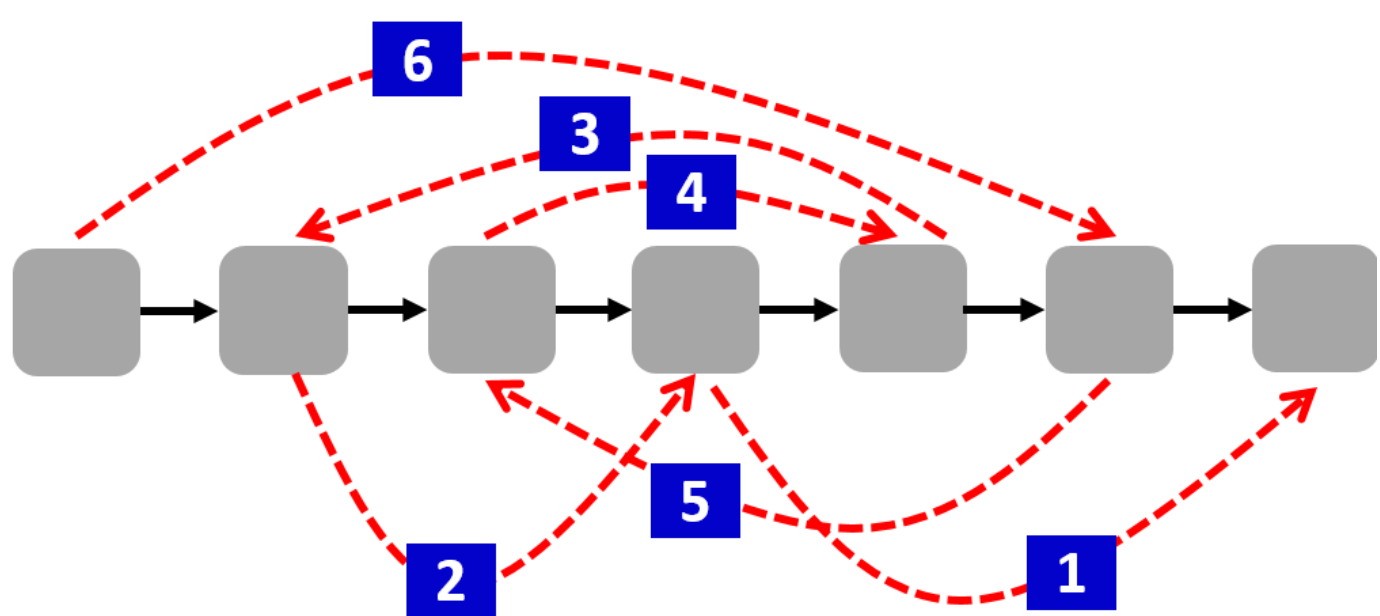


The Problem

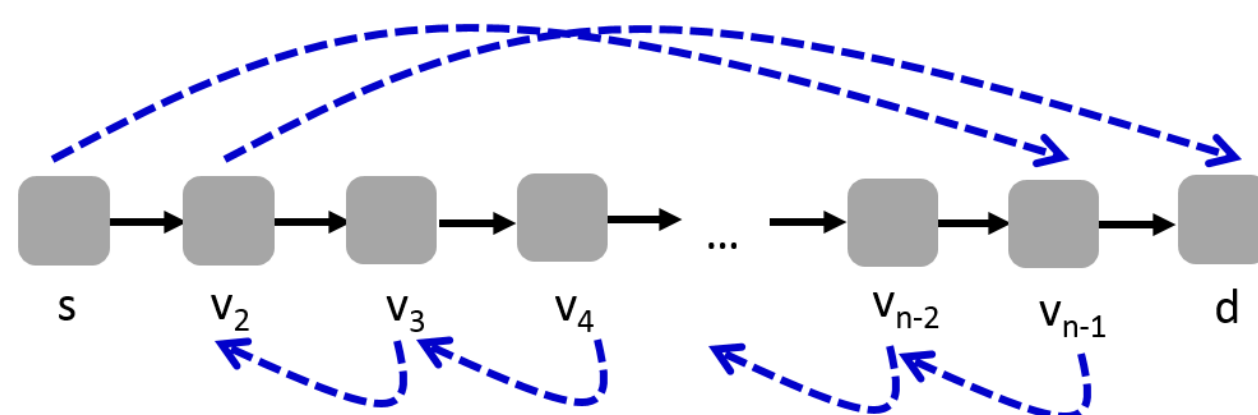
How to migrate a set of flows from their initial routes to their final route, such that: Loop-freedom is preserved, waypoints are respected, capacity constraints are met?

Loop-Free Flow Migration

n rounds easy



But sometimes needed

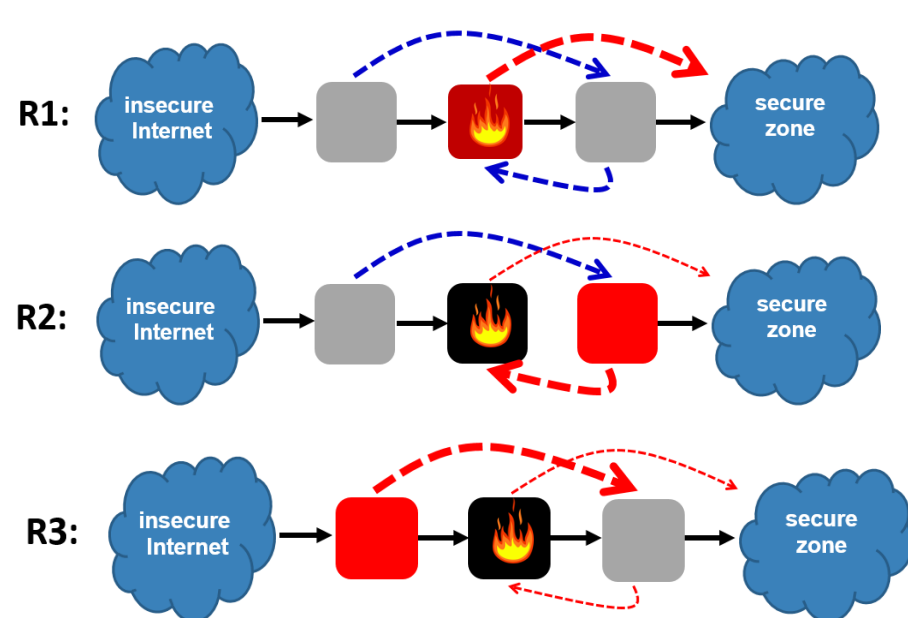


Other Results

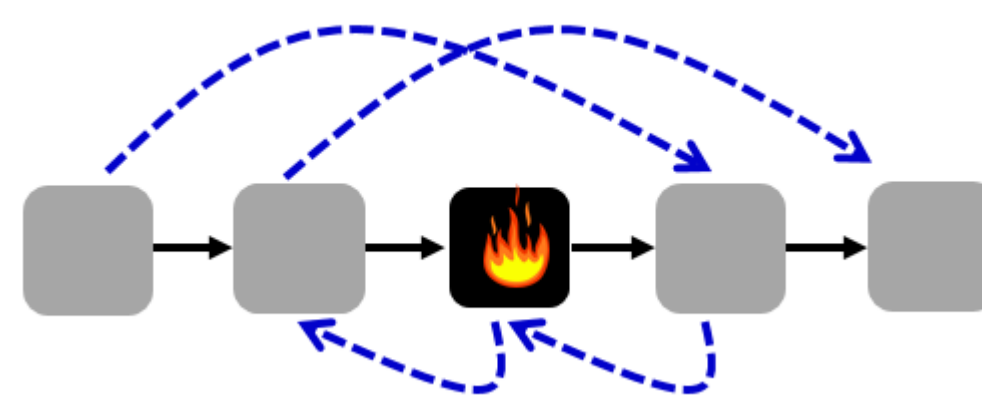
2 rounds in P
3 rounds NP-hard
Relaxed $O(\log n)$ rounds

Waypoint Enforcement

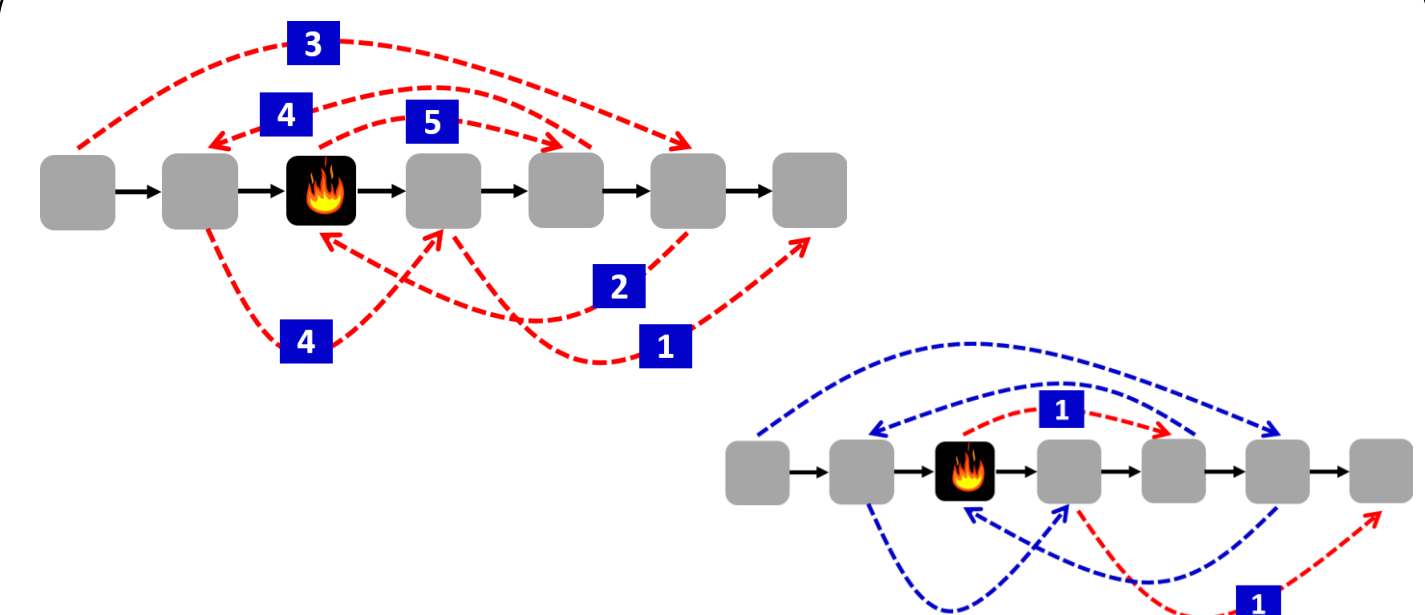
Example



Sometimes impossible



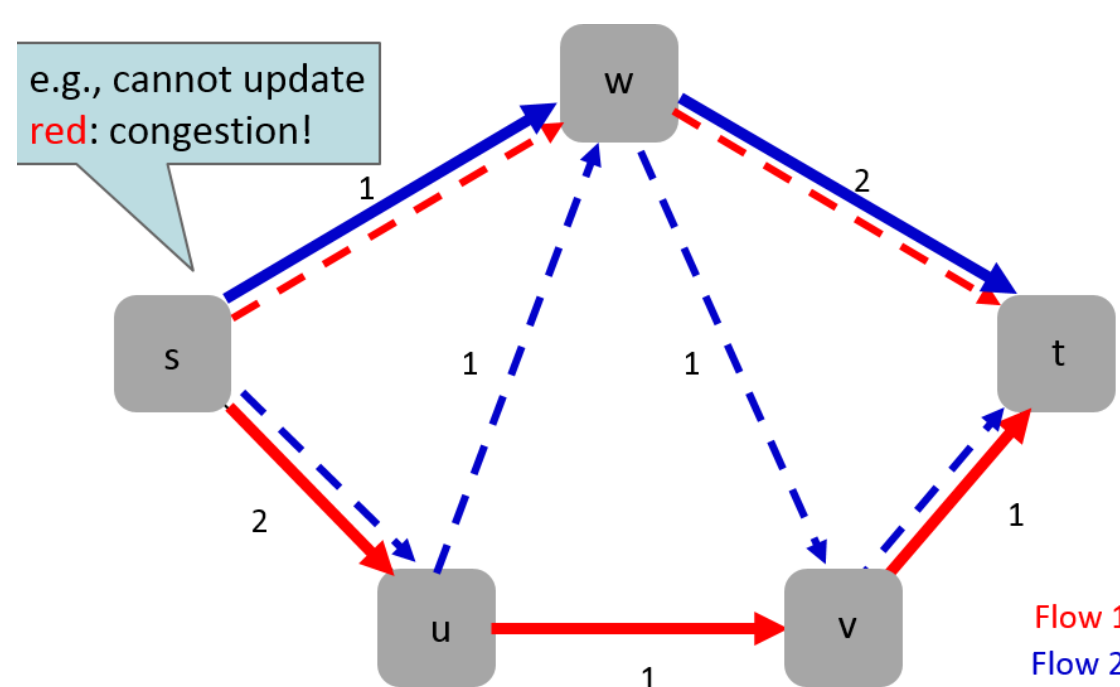
Other Results



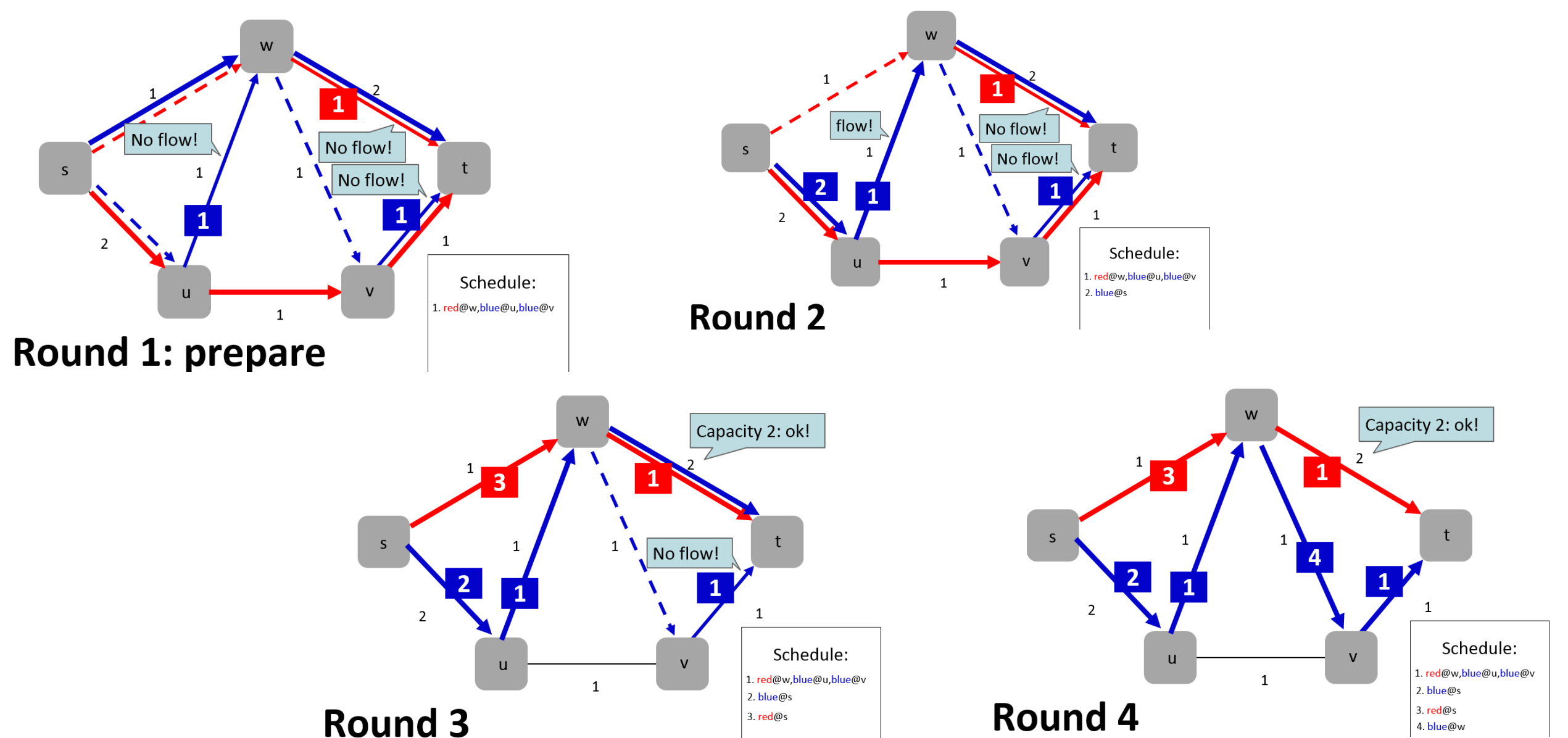
Feasibility: NP-hard to decide

Congestion-Freedom

Example



A solution



References:

- [Transiently Secure Network Updates](#) Arne Ludwig, Szymon Dudycz, Matthias Rost, and Stefan Schmid. 42nd ACM SIGMETRICS, Antibes Juan-les-Pins, France, June 2016.
- [Scheduling Loop-free Network Updates: It's Good to Relax!](#) Arne Ludwig, Jan Marcinkowski, and Stefan Schmid. ACM Symposium on Principles of Distributed Computing (PODC), Donostia-San Sebastian, Spain, July 2015.
- [Congestion-Free Rerouting of Flows on DAGs](#) Saeed Akhoondian Amiri, Szymon Dudycz, Stefan Schmid, and Sebastian Wiederrecht. ArXiv Technical Report, November 2016.
- [Survey of Consistent Network Updates](#) Klaus-Tycho Foerster, Stefan Schmid, and Stefano Vissicchio. ArXiv Technical Report, September 2016.