On linear-time data dissemination in dynamic trees

Martin Zeiner, Manfred Schwarz, Ulrich Schmid

ECS, Institute of Computer Engineering, TU Wien
{mzeiner,mschwarz,s}@ecs.tuwien.ac.at

We study the following data dissemination problem: In a set of n nodes, every node has a unique piece of information. The communication of the nodes is organized in discrete synchronous lock-step rounds. In each round every node sends all currently known pieces of information to all other nodes. Which nodes receive this message is determined by the actual communication graph, which may change from round to round. When one piece of information is known by all nodes, dissemination is done.

Such network models are interesting as they capture the communication behavior of wireless communication, process crash/recovery and process mobility far better then standard static communication models. In such distributed systems data dissemination is a pivotal task in many applications.

Charron-Bost, Függer, and Nowak proved an upper bound of $\mathcal{O}(n \log n)$ rounds for the case where every communication graph is an arbitrary rooted tree. We established linear-time data dissemination bounds for certain subclasses of rooted trees. In particular, we proved that only $(n-1)$ rounds are needed if the underlying graph is a directed path. Analogously, in undirected paths $\lceil (n-1)/2 \rceil$ rounds are needed. Besides these results, we will focus on similarities und differences between the directed and undirected model and discuss open questions.

Acknowledgment
This work was supported by the Austrian Science Fund (FWF) projects ADynNet (P28182) and RiSE (S11405).