# Table des matières

## Asymptotically Tight Bounds on the Time Complexity of Broadcast and its Variants in Dynamic Networks

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Data dissemination is a fundamental task in distributed computing. This paper studies *broadcast problems* in various innovative models where the communication network connecting $n$ processes is dynamic (e.g., due to mobility or failures) and controlled by an adversary.

In the first model, the processes transitively communicate their ids in synchronous rounds along a rooted tree given in each round by the adversary whose goal is to maximize the number of rounds until *at least one id is known by all processes*. Previous research has shown a $\lceil \frac{3n-1}{2} \rceil - 2$ lower bound and an $O(n \log \log n)$ upper bound. We show the first linear upper bound for this problem, namely $\lceil (1+\sqrt{2})n - 1 \rceil \approx 2.4n$.

We extend these results to the setting where the adversary gives in each round $k$-disjoint forests and their goal is to maximize the number of rounds until there is a set of $k$ ids such that *each process knows of at least one of them*. We give a $\left\lceil \frac{3(n-k)}{2} \right\rceil - 1$ lower bound and a $\frac{\pi^2+6}{6}n + 1 \approx 2.6n$ upper bound for this problem.

Finally, we study the setting where the adversary gives in each round a directed graph with $k$ roots and their goal is to maximize the number of rounds until *there exist $k$ ids that are known by all processes.* We give a $\left\lceil \frac{3(n-3k)}{2} \right\rceil + 2$ lower bound and a $\lceil (1+\sqrt{2})n \rceil + k - 1 \approx 2.4n + k$ upper bound for this problem.

For the two latter problems no upper or lower bounds were previously known.

# Références

[1] El-Hayek, Antoine, Monika Henzinger, and Stefan Schmid. "Asymptotically Tight Bounds on the Time Complexity of Broadcast and Its Variants in Dynamic Networks." *14th Innovations in Theoretical Computer Science Conference (ITCS 2023)*. Schloss Dagstuhl-Leibniz-Zentrum für Informatik, 2023.