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ΣΕΜΙΝΑΡΙΟ ΛΟΓΙΚΗΣ ΚΑΙ ΑΛΓΟΡΙΘΜΩΝ

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Θέμα: Distributed broadcasting with few transmissions in ad hoc radio networks

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Περίληψη

A practical measure of energy efficiency of distributed communication protocols is the maximum number of messages that any network node may send during the protocol. Here, we consider distributed broadcasting under the constraint that this number not exceed a given bound, and we study the problem for radio networks of unknown topology. In particular, we examine k-shot broadcasting: a bound k is given and a node may transmit at most k times during the protocol. We mostly focus on oblivious protocols, that is, protocols where each node decides whether to transmit or not with no consideration of the transmission history. Our main contributions are: (a) a lower bound of $\Omega(\frac{n^2}{k})$ on the number of steps of any valid oblivious k-shot broadcasting protocol, and (b) an oblivious protocol that achieves a matching upper bound, namely of $O(\frac{n^2}{k})$, for every $k \leq \sqrt{n}$ and an upper bound of $O(n^{3/2})$ for every $k > \sqrt{n}$. We also initiate the study of general broadcasting protocols with few transmissions by showing an $\Omega(n^2)$ lower bound for any adaptive 1-shot protocol.

(Joint work with Paraschos Koutris)