An exponential improvement on the MST heuristic for the Minimum Energy Broadcasting problem

Luca Moscardelli
Joint work with Ioannis Caragiannis and Michele Flammini
Dipartimento di Informatica, Universit degli studi di L'Aquila

Abstract

We present a new approximation algorithm for the *Minimum Energy Broadcast Routing* (MEBR) problem that exponentially decreases the aprroximation factor of the well-known Minimum Spanning Tree (MST) heuristic. Namely, for any instance where a minimum spanning tree of the set of stations is guaranteed to cost at most ρ times the cost of an optimal solution for MEBR, we prove that our algorithm achieves an approximation ratio bounded by $2\ln\rho - 2\ln 2 + 2$. This result is particular relevant for its consequences on Euclidean instances where we significantly improve previous results.

In fact the approximation ratio is reduced from 6 to 4.2 for $d = 2$, from 18.8 to 6.49 for $d = 3$ and in general from $3^d - 1$ to $2.20d - 2\ln 2 + 2$ for $d > 3$. Nevertheless the considerable research effort in the area, this is the first algorithm shown to have an approximation guarantee better than the MST heuristic.