HOW MANY WIRELESS SENSORS ARE NEEDED TO GUARANTEE CONNECTIVITY OF A ONE-DIMENSIONAL NETWORK WITH RANDOM INTER-NODE SPACING?

Vitaliy Kurlin

Department of Mathematical Sciences, Durham University, Durham DH1 3LE, United Kingdom
Email: vitaliy.kurlin@durham.ac.uk

Lyudmila Mihaylova

School of Computing and Communication Systems, Lancaster University, Lancaster LA1 4WA, United Kingdom
Email: mila.mihaylova@lancaster.ac.uk

SUMMARY

An important problem in wireless sensor networks is to find an optimal number of randomly deployed sensors to guarantee connectivity of the resulting network with a given probability. The authors describe a general method to compute the probabilities of connectivity and coverage for one-dimensional networks with arbitrary densities of inter-node spacings. A closed formula for the probability of connectivity is derived when inter-node spacings have arbitrary different piecewise constant densities. Explicit estimates for a number of sensors to guarantee connectivity of the network are found for constant and normal densities.

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