

## 无线传感器网络的连通覆盖临界条件分析

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基金项目：

摘要：

连通与覆盖控制作为无线传感器网络中两个最基本的问题，取决于网络配置及节点的传播距离，反映了网络的感知质量与资源的优化分配。为了用最优化数量的传感器节点来改善并确保网络的连通与覆盖，在分析现有研究成果的基础上，提出了满足渐进连通覆盖的临界充分条件及必要条件。理论分析及仿真实验均表明，提出的临界条件是更紧凑和规则化的条件，有助于对无线传感器网络进行更细致的研究。

关键词：无线传感器网络；连通；覆盖；临界条件

## A Survey on the Critical Conditions for Connectivity and Coverage in Wireless Sensor Networks

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**Abstract:**

The topology attributes of both connectivity and coverage in a wireless sensor network depend on the spatial distribution of the nodes and their transmission range. This paper first models the network with random node distribution as a geometric random graph. Then it proposes an analytical expression of the required critical transmission range of a node, for a given node density, to create an almost surely connected network. Equivalently, if the maximum range of the nodes is given, it can estimate effectively how many nodes are needed to cover a certain area with a connected network. With experimental test in various scenarios, the method is proved to achieve guaranteed degrees of coverage and connectivity, valuable for researchers in this area.

**Keywords:** wireless sensor networks; connectivity; coverage; critical condition

投稿时间：2010-04-27

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