基于SMP的分簇WSN生存性评估模型

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摘　要：

无线传感网（WSN）很适合用于战场侦察和应急通信等场合，增强WSN的生存能力并对其进行量化评估逐渐受到关注。本文提出一种基于半马尔可夫过程（SMP）的分簇WSN生存性评估模型，该模型在考虑应急通信中簇头生存状态的基础上建立了基于SMP的簇头生存状态转移图；结合网络生存性需求计算WSN的生存性效用函数，并定量分析了多种评价指标对网络生存能力的影响及其相关性；进而，利用该模型对采用SPRC协议和RLEACH协议的WSN生存能力进行了量化评估和比较分析。分析与验证结果表明，提出的生存性评估模型不仅可以对应急通信中WSN的生存能力进行客观有效的评估，还能对WSN的实际部署和应用提供参考依据。

关键词：无线传感网；应急通信；可生存性；评估模型；半马尔可夫过程

Survivable Estimation Model for Clustered Wireless Sensor Network

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Abstract:

Wireless sensor network is suitably applied in some occasions, such as battlefield scout and emergency communication, how to evaluate the survival ability quantitatively has gradually attracted attention. A survivable evaluation model of clustered WSN based on the semi-markov process is put forward in this paper. By considering the survival states of the cluster heads in emergency communication, the survivability states transition diagram of cluster heads is established based on the semi-markov process. Combining with network survivability requirements, the survivability effectiveness function of the entire network is calculated, and the influence and correlation of various evaluation indexes of network survivability is analyzed quantitatively. And then, using this model the survivability of the WSN running under SPRC protocol and RLEACH protocol is quantitatively evaluated. Analysis and simulation results show that, the model not only can be used to evaluate the survivability of WSN in emergency communication objectively and effectively，but can provide reference for the practical deployment and application of WSN.

Keywords: Wireless Sensor Network; Emergency Communication; Survivability; Estimation Model; Semi-Markov Process

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