

研究论文

临近空间平台自组织网络优化部署的博弈算法

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摘要:

针对临近空间平台自组织网络问题, 提出基于博弈学习的网络节点分布式优化方案. 将临近空间平台通信网络部署建模成一个势力场博弈问题, 以最优化网络的覆盖范围和服务质量为目标, 通过引入RSAP学习算法对该势力场博弈进行优化求解, 保证博弈能够依概率收敛到纳什均衡, 得到临近空间平台网络部署优化目标函数的极值解. 利用博弈学习方法, 使临近空间平台在未知待覆盖区域的全局信息的情况下, 进行分布式的动态优化. 仿真结果表明, 该算法能够根据任务需求的分布自适应部署网络节点, 并迅速达到最优布局.

关键词: 临近空间平台 自组织网络 博弈论 学习算法

Deployment optimization of the self-organized network on near space platforms based on the game theoretical learning algorithm

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Abstract:

Aiming at the self-organized networking problem on near space (NS) communication platforms, a distributed optimization method for the deployment of the network on NS platforms is proposed based on the game theoretical learning algorithm. First, the self-organized network deployment on NS platforms is modeled as a potential game, and the optimizing objective is the network's coverage area and the quality of service. Then the potential game can be solved by the Restricted Spatial Adaptive Play (RSAP) algorithm, which leads the game to a guaranteed Nash equilibrium with convergence in probability. The Nash equilibrium is the extremal solutions to the objective function of the deployment optimization. The game theoretical learning method enables NS platforms to be deployed in a distributed way without the global information on regions to be covered. Simulation results show that the proposed optimization method deploys the nodes of the MANET on demand, and can quickly achieve the optimal configuration.

Keywords: near space platform ad hoc network game theory learning algorithm

收稿日期 2012-11-07 修回日期 网络版发布日期

DOI: 10.3969/j.issn.1001-2400.2013.05.030

基金项目:

国家自然科学基金重点资助项目(60832005); 中央高校基本科研业务费专项资金资助项目(K5051302016)

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