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基于PSO的无线Mesh网关优化部署算法

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摘　要：

无线Mesh网关的优化部署目标是对一给定的无线Mesh网络，合理地确定网关部署的方案，在满足用户通信时延、通信带宽以及网关相关属性约束(如网关的度，簇度数)的前提下，使得网关数量最少、网关间负载均衡以及总体通信代价最小。利用粒子群算法在多目标寻优方面的优势，提出了基于粒子群的无线Mesh网关优化部署算法。对粒子的速度、速度的相关运算规则和粒子的运动方程进行了重新定义与设计，然后提出了基于网关启发式初步部署与优化的二阶段粒子群优化算法。理论分析与仿真实验表明，基于PSO的优化算法得到的网关数量不劣于其它算法得到的结果，而且在其它性能指标方面：通信代价、网关节点数量、负载均衡方面优势明显，与Recursive_DS算法的相比分别提高了38.15%，7.85%，7.3%。

关键词：无线Mesh网；网关部署；多目标优化；粒子群算法；二阶段优化

A novel Algorithm for Deploying Gateways in Wireless Mesh Network Based on PSO

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Abstract:

The goal of Wireless Mesh gateway deployment for a given wireless Mesh Networks is to optimize gateway deployment which meet user communication delay, communication bandwidth constraints, as well as gateways related attributes (such as Gateway, cluster degree) under the premise of making the least number of gateways, load balance between the gateway and least communications cost at the same time. Particle swarm algorithm have advantage in multi-objective optimization areas. An Optimization Gateway deployment algorithm is proposed based on particle swarm optimization (PSO). this paper redefines particle's velocity, the operation rules of velocity, and the moving equation of particle., and then made a heuristic-based Gateway initial deployment and optimization of the two-stage PSO algorithm. Theoretical analysis and simulation results show the number of gateways based on PSO algorithm is not inferior to the results of other, but in other performance areas: communication costs, the number of gateway nodes, load balancing obvious advantages, compared with Recursive_DS algorithm increased by 38 .15%, 7.85%, 7.3%.

Keywords: wireless mesh network; gateway placement; multi-objective optimization; particle swarm optimization; two-stage optimization

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