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DHT网络基于债务关系的公平文件交换

于 坤, 吴国新, 许立波, 陈 刚

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于 坤^{1,2}, 吴国新¹, 许立波¹, 陈 刚¹

¹(计算机网络和信息集成教育部重点实验室(东南大学),江苏 南京 210096)

²(淮阴工学院 计算机系,江苏 淮阴 223001)

作者简介: 于坤(1972—),男,江苏淮安人,博士生,讲师,主要研究领域为P2P网络信任,激励机制.吴国新(1956—),男,教授,博士生导师,主要研究领域为网络协议及标准,网络安全.许立波(1976—),男,博士生,主要研究领域为流量管理,P2P网络协议.陈刚(1978—),男,博士生,CCF学生会员,主要研究领域为P2P内容分发技术.

联系人: 于 坤 Phn: +86-25-83792310, E-mail: varguard@yeah.net

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Abstract

The selfishness of nodes degrades the system usability of P2P network. Debt relationship based file exchange network constructs an incentive mechanism which induces cooperation and guarantees fairness in file exchange. The key point of the mechanism is finite neighbors, an inherent characteristic in DHT (distributed hash table) networks and so is the interacting between nodes form a repeated games. DFFE (debt relationship based fair file exchange in DHT network) protocol only needs to maintain a little local interacting information, so the protocol cost is low and scalable for large network. In routing, one-hop information based greedy arithmetic is used. Game among rational nodes exists a Nash equilibrium and the approximate algorithm of strategy selection gradually converges. Simulations indicate the validity of incentive mechanism and the steady performance in dynamic networks.

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摘要

P2P(peer to peer)网络中,节点的自私行为极大地降低了系统的可用性.基于债务关系的文件交换网络,构建了一种促进合作的激励机制.同时,该机制保证了文件交换的公平性.激励机制的关键在于DHT(distributed hash table)网络邻居有限的固有特征,因而节点间的交互易于形成重复博弈.DFFE(debt relationship based fair file exchange in DHT network)协议只需维护很少的本地节点交互信息,协议开销小、网络扩展性好.网络路由采用基于一跳信息的贪婪算法.理性节点间的博弈存在纳什均衡,其策略选择的近似算法具有渐进收敛性.仿真实验表明了激励机制的有效性和在动态网络中性能的稳定性的稳定性.

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