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基于Region多层结构P2P计算网络模型

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Abstract
Gnutella application layer protocol simply uses flooding algorithm to route peer's querying, which is just implemented on application layer and doesn't use down-layer's information routing of Internet. So it has poor scalability and low efficiency. This paper uses the model of "small world and power law" as the theoretical foundation, and in the light of the users' requirement and a shared organization layer and region of logic manage-unit, a new distributed peer-to-peer network model of RLP2P(region-layer P2P) with multi-layer structure based on region is proposed, and its prototype system is implemented. A new optimized Multilayer Light-Gossip route strategy is implemented. This paper studies the stress and stretch with the model which has two intuitive metrics of goodness defined to evaluate the quality of the data paths. At the same time, the idea is put forward about the tradeoffs between the stress and stretch. Simulation results about RLP2P's protocol show that it could effectively solve the above problems, and the larger the network size is, the more obvious the superiority of its comprehensive performance is. So the model is reasonable and effective.

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摘要
分布式P2P网络Gnutella模型中共享信息查询的路由协议为"洪泛"算法,其协议机制仅在应用层实现,缺乏对Internet底层通信子网路由资源的利用,存在可扩展性、性能与效率不高的问题.以"小世界和幂规律"模型为理论基础,以层和域为基本逻辑管理单位,按用户需求和共享目的组织域,提出了基于Region多层结构P2P网络模型RLP2P(region-layer P2P),实现了其系统原型;实现了一个优化的Multilayer Light-Gossip分级路由策略;量化分析了表征模型数据通道质量指标的压力和伸展率,提出了综合考虑压力和伸展率的思想.模拟分析表明,RLP2P模型可以有效地解决可扩展性、性能与效率不高问题,且网络规模越大,其综合性能的优越性越明显,因此,模型是合理、有效的.

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