一种有效的Peer-to-Peer自适应拓扑进化协议

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Abstract
Current unstructured peer-to-peer (P2P) systems lack fair topology structures, and take no consideration for vicious action of peers. The mainly reason is that the topologies are not sensitive to peer's trust, and take no consideration for the trust computation of different domains. First, a domain-based P2P trust model is presented in this paper. Then, based on the trust model, a peer-level protocol for forming adaptive topologies for unstructured P2P networks is proposed. The protocol aims at the topologies evolution of embodied domains, and makes good peers locate good position and bad peers locate bad position in the corresponding domains, which guarantees the impartiality of topology. On the other hand, the protocol can restrain the vicious action of peers effectively, and also has the incentive capacity, which encourages peers to provide more authentic services in order to get more return on services. Analysis and simulations show that, compared with the current topologies, the resulting topologies are more efficient and more robust on security problems.

摘要
现有的无结构Peer-to-Peer(P2P)系统缺乏对拓扑公平性的考虑,并且不能对某些节点的恶意行为进行有效的抑制.其主要原因在于构造的拓扑对节点可信度的不敏感性,忽略了节点在不同领域中可信度的区别.据此,首先给出了基于领域的P2P信任模型的定义,然后在此基础上提出了一种针对无结构化P2P网络的自适应拓扑进化协议.该协议可以针对具体的领域进行拓扑进化,使得领域内的高可信节点占据相应领域拓扑的有利位置,低可信节点处于不利位置,从而体现拓扑的公平性.该协议同时能够对节点的恶意行为进行有效的抑制,并具有激励性质,鼓励节点提供更好的服务,以获得更高的回报率.分析和仿真结果表明,该协议较之现有协议,在拓扑的有效性和安全性等方面有较大的提高.

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