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Editorial

Toward the Next-Generation Peer-to-Peer Services

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Recent years have witnessed the blossom of the P2P application model on the Internet. Popular examples include P2P file sharing networks, streaming multimedia and content distribution networks, and P2P metaservices such as peer-to-peer lookup services, reputation services, and network underlays. In this special issue, we aim to present both a timely retrospect of recent achievements in P2P services and an outlook of new challenges ahead. The invited papers address a variety of topics, including the following.

The first paper, which is "A measurement study of the structured overlay network in P2P file-sharing systems," conducts a measurement study on the E-Mule overlay network. It presents a novel crawler program design that provides a perspective of overlay networks from a single user viewpoint, which helps identify new vulnerabilities such as DDOS attacks.

The second paper, "Analysis and implementation of gossip-based P2P streaming with distributed incentive mechanisms for peer cooperation," studies the randomized gossip-based scheme for P2P streaming and proves that an incentive mechanism can be created for a live streaming P2P protocol while preserving the asymptotic properties of the gossip-based scheme. It further proposes a functional architecture and protocol format for this new streaming paradigm.

The third paper, "Enhanced P2P services providing multimedia content," aims to remove the dependence of current P2P query systems on unique identifiers or keywords. It proposes an original image and video sharing system where users can interactively search for interesting resources using content-based image and video retrieval techniques.

The fourth paper, "A hybrid query scheme to speed up queries in unstructured peer-to-peer networks," studies the problem of locating resources in unstructured P2P networks. By identifying problems in existing approaches such as flooding and random walk, the paper proposes a new hybrid query scheme that groups peers into clusters based on similar interests, and improves communication efficiency by mixing intercluster queries and intracluster queries.

The fifth paper, "Globally decoupled reputations for large distributed networks," points out the vulnerability of existing P2P reputation systems to unfair rating attacks, and recommends that reputation systems decouple each peer's reputation as service provider from that as service recommender, making reputations more resistant to tampering. It further proposes a scalable approach to compute decoupled service and feedback reputations, and demonstrates the effectiveness of the new model against previous nondecoupled reputation approaches.

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