

# Towards Global Collaborative Computing: Opportunities and Challenges of Peer to Peer Networks and Applications

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**Abstract.** Collaborative computing has emerged as a promising paradigm for developing large-scale distributed systems. Peer to Peer (P2P) and Grid computing represent a significant step towards global collaboration, a fundamental capability of network computing. P2P systems are decentralized, self-organizing, and self-repairing distributed systems that cooperate to exchange data and accomplish computing tasks. These systems have transpired as the dominant consumer of residential Internet subscribers' bandwidth, and are being increasingly used in many different application domains. With rapid advances in wireless and mobile communication technologies, such as wireless mesh networks, wireless LANs, and 3G cellular networks, P2P computing is moving into wireless networking, mobile computing, and sensor network applications. In this keynote, I will discuss some important opportunities and challenges of Peer to Peer networks and applications towards global collaborative computing paradigm. I will first review the P2P research and development in the past few years, focusing on the remarkable results produced in P2P system scalability, robustness, distributed storage, and system measurements, the continued evolution of P2P systems, and how today's state-of-the-art developments differentiate from earlier instantiations, such as Napster, Gnutella, KaZaA, and Morpheus. Then I will discuss some important challenges for wide deployment of P2P computing in mission-critical applications and future computing environments.

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