The purpose of this mini-track is to provide a forum for researchers and practitioners to discuss the software technology issues related to peer-to-peer (P2P) computing and its evolving paradigm. While file sharing bootstrapped the application space, we now see P2P based chat rooms, global VoIP networks, computing grids, collaborative software design, development and debugging, sensor networks, distributed disk storage and Multi-Agent Systems to give us a short list of examples. These applications more often than not run on non-interoperable infrastructures. Peer-to-Peer is in dire need of a unifying, underlying set of communication protocols if it is to have the same impact on the Internet as the IP stack did in the 1980’s. Almost any device with an RF signal can connect to the Internet, and become a Peer Node. The research branch of the IETF, the Internet Research Task Force (IRTF), has a Research Group on P2P with the goal of proposing P2P protocols appropriate for the IETF to standardize for the Internet. Still, research problems on the fundamental behavior of Peer Nodes abound. As a consequence, the research community has taken it upon itself to put in place a solid theoretical foundation of P2P computing by addressing issues like routing, trust, security, content distribution, P2P platform performance, lookup, search, computational grids based on P2P platforms, etc.

The above efforts are yielding a common paradigm for Peer-to-Peer computing. It is a model characterized by an increasing decentralization with the additional reliance on deterministic super-peers for high performing production networks that must yield a responsive user experience. The latter is one of the absolute requirements if P2P is to attract customers to generate revenue growth. The other is security: P2P networks must protect the users’ privacy as well as artists’ copyright. These issues pose a rich and new problem space for distributed computing research because Peer-Nodes may be autonomous, ambient and, if desired, anonymous; and they play the roles of both clients and servers. It necessitates a natural evolution or mapping of the Internet protocols that then must also be characterized in view of these new requirements.

While the industry is hard at work trying to impose tomorrow’s “legacy architectures” by the means of so called Web Services, Peer-to-Peer computing goes one step further and postulates that although there will always be a need for centralization in the client-server sense, the general model that should prevail is again one where roles are not clear cut but dynamic. Peers are thus actors that appear and disappear dynamically, hence pushing back and forth the edges of the network, potentially endorsing all possible roles at any point in time. In this context, hard-wired centralized services are only one among many interaction patterns that can be achieved in Peer-to-Peer architectures that more closely capture the features of a real world, distributed and potentially ambient computing eco-system.

In this year’s mini-track we present three papers: The first paper, “Semantic Hypercup,” investigates adding semantic data to broadcast search queries to reduce the traffic generated by these same searches on a Hypercup overlay network; the second paper, “Benefit and Pricing of Spatio-temporal Information in Mobile Peer-to-Peer Networks,” quantifies the value/benefit introduced by the dissemination of resource reports in mobile Peer-to-Peer networks, where each such report represents the availability of a resource; and the final paper, “Distributed Uniform Sampling in Unstructured Peer-to-Peer Networks,” addresses the critical problem of efficient distributed uniform sampling via random walks in large unstructured Peer-to-Peer networks the goal being to then use randomized algorithms for activities like search, replication, routing, and resource management to achieve lower overheads. We are sure this discussion will promote enthusiastic discussions of the evolving P2P paradigm.