# Chapter 54
# Trust Calculation and Management in P2P and Grid Systems

**Karaoglanoglou Konstantinos**
*Aristotle University of Thessaloniki, Greece*

**Helen Karatza**
*Aristotle University of Thessaloniki, Greece*

## ABSTRACT

*The significance of efficient security mechanisms in P2P and Grid systems is unquestionable, since security is considered to be a quality of service factor for such systems. Traditional security mechanisms in P2P and Grid systems include encryption, sand-boxing and other access control and authentication mechanisms. Unfortunately these techniques incur additional overhead. By using trust and reputation-based mechanisms, the additional overhead is minimized. The deployment of efficient trust mechanisms results to a safer communication between P2P or Grid nodes, increasing the quality of service and making P2P and Grid technology more appealing. The aim of this book chapter is to lay the theoretical background of concepts such as trust, reputation, trust graphs and trust functions. Furthermore it presents classification schemes for trust functions, discussing the characteristics and differences of each classification. Finally, it analyses popular trust and reputation-based management mechanisms that have been implemented in both P2P and Grid systems.*

## INTRODUCTION

P2P systems consist of a group of entities called peers that interact with each other without the presence of a central coordinating authority (decentralized P2P systems) (Figure 1). A peer in such a system can act both as a client and a server (Suryanaranyana & Taylor, 2004). It can request services from other entities as well as provide services to other entities in the system. Each peer has a limited perspective of the system and relies upon information received from other peers to make local autonomous decisions. Decisions made by each decentralized peer may well conflict with those made by other peers.

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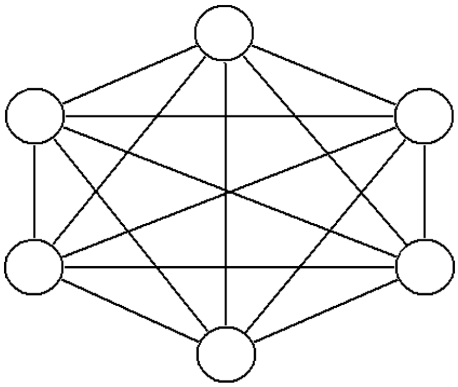
*Figure 1. An example figure of a P2P system*



A Grid (Figure 2) can be defined as "a large-scale, geographically distributed, hardware and software infrastructure composed of heterogeneous networked resources owned and shared by multiple administrative organizations which are coordinated to provide transparent, dependable, pervasive and consistent computing support to a wide range of applications. These applications can perform distributed computing, high throughput computing, on-demand computing, data-intensive computing, collaborative computing or multimedia computing" (Bote-Lorenzo, Dimitriadis & Gomez-Sanchez, 2004).

P2P and Grid computing are both approaches to distributed computing mainly concerned with the organization of resource sharing in large scale computational environments. Though both types of systems share the common basic concept of resource-sharing, they followed different evolutionary paths. P2P systems focus on dealing with factors such as fault tolerance, transient populations and self-adaptation. On the other hand, research in Grid systems focuses on definitions of common protocols and standardized infrastructures to achieve interoperability.

At first, Grids were comprised by fully dedicated entities. These participating entities communicated with a high trust level, alleviating the requirement of complex reputation and trust models. As time progressed, Grids grew in size and new entities joined the systems. This fact has made the deployment of efficient trust mechanisms in Grid systems a primary concern.

*Figure 2. An example figure of a Grid system*