Chapter XVI
P2P–Based Management of Collaboration Communication Infrastructures

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ABSTRACT

The use of information management tools in open and unbounded operational environments demands an efficient and robust communication infrastructure in order to allow the appropriate transmission of large amount of information and the collaboration among several humans located in geographically distant places, in different organizations, and usually involving several network administrative domains. In order to provide such efficient communication infrastructure, mechanisms for data network management must be used. However, traditional network management models do not provide the required support to the management of such networks. In this context, an alternative distributed network management model must be employed to the efficient management of the communication infrastructure required to support these information management tools. This chapter presents the use of peer-to-peer (P2P) technologies as support for the management of such networks. It presents a P2P-based distributed network management model and a network management environment that follows this model. The functionalities required for the environment are discussed, including its features, potentialities, and drawbacks.

INTRODUCTION

The current information management paradigms present limitations when applied to domains where the operational environment is open and unbounded, such as in human collaboration domain or in complex activities. A new approach to information management that focuses on these requirements and provides tools for them is Open Information Management (Yli-Hietanen & Niiranen, 2008).

The use of information management tools that deal with open operational environments demands an efficient and robust communication infrastructure in order to allow the appropriate transmission of large amount of information and the collaboration among several humans located in geographically distant places, in different organizations, and usually involving several network administrative domains. In order to provide such efficient communication infrastructure, mechanisms for data network management (Clemm, 2007; Commer, 2006; Hegering, Abeck, & Neumair, 1999; Leiwand & Conroy, 1996; Udupa, 1996) must be used.

However, traditional network management models used in current days do not provide the required support to the management of such networks that encompasses several administrative domains. In this context, an alternative distributed network management model must be employed to the efficient management of the communication infrastructure required to support that information management tools.

A promising alternative for these needs is the use of peer-to-peer (P2P) technology (Androutsellis-Theotokis & Spinellis, 2004; Lua, Pias, Sharma, & Lim, 2005), as investigated by Granville et al. (2005) and Panisson, Melchiors, Granville, Almeida, and Tarouco (2006). This chapter will cover the use of P2P as supporting technology for the management of such networks. It will present a P2P-based distributed network management model and a management environment that follows this model. When compared to traditional management environments, the use of this new environment allows the management of networks with several administrative domains, provides better fault tolerance and scalability as well as support for collaboration among human administrators belonging to different network administrative domains. In addition, it provides data and experience sharing among the different entities involved in network management and allows the simplified maintenance of the management environment.

The main objective of this chapter is twofold. First, it presents the limitations of current network management models to managing the communication infrastructure required to support information management tools in open and unbounded operational environments. Second, it presents the distributed network management model and environment based on P2P technology, explaining why such model is suitable for the management of this communication infrastructure and how a management environment based on such model is conceived.

This chapter is organized in five main sections. The *Background* section provides a definition about terminology, network management and P2P technology. The *Current Issues and Problems* subsection of *P2P-Based Distributed Network Management* section discusses the limitations of the current network management models to manage the data communication networks required to support information management tools such as previously discussed. The following subsections of this section present the P2P-based distributed network management model, the network management environment that materializes this model and the services and applications of the environment. *Future Trends* section discusses emerging tendencies. Finally, the *Conclusion* section presents the concluding remarks.

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