

Chapter 85

Trust-Based Security Mechanisms for Self- Organized Networks (SONs)

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ABSTRACT

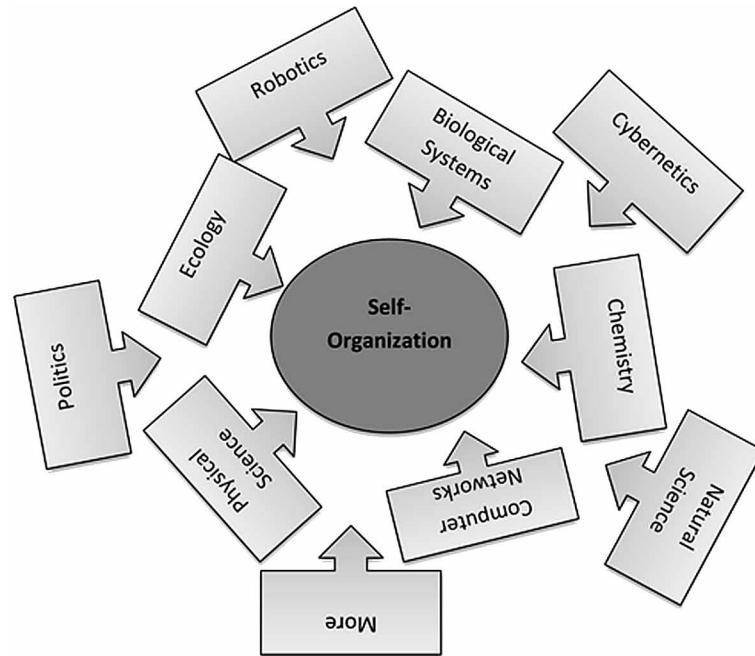
Self-Organized Networks (SONs) are an advancement of today's communication that arises to overcome the problems in traditional communications in terms of their planning, configuration, optimization, healing and management since the rate of utilizing communication technology is gradually increasing day by day hence an optimum mechanism is needed to cope up with all the changes in the communication era, the result is self-organized networks. The success of SONs depends on how it is effectively utilized without any compromise in its security. However its unique characteristics offer both opportunities and challenges. The aim of this chapter is to begin with the essential concept of SONs such as Mobile Ad Hoc Networks (MANET), Vehicular Ad Hoc Networks (VANET), Wireless Sensor Networks (WSN), Wireless Mesh Networks (WMN), Peer to Peer Networks (P2P), Cognitive Radio Networks, Bio-Inspired Networks and Internet of Things (IoT) and their limitations in different perspectives. As these networks have penetrated into the human life with an anytime anywhere capability, the security of the data being processed and communicated through these networks become vital. This chapter tries to bring out the issues and challenges in providing a trust based solution mechanisms for this type of networks.

1. INTRODUCTION

The world consisting of many different and connected parts and all are around us with complex process and system structures. Self-organization is an inherent feature that is being used by all living organisms and support to prevent the complex by the way it motivated by living world. The word self-organization was first proposed by the cyberneticist W. Ross Ashby in the year of 1940. Because of its inherent nature

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Figure 1. Interdisciplinary concept of self-organization



and practice it is utilized by diverse fields such as physics, chemistry, biology, cybernetics, human society, psychology, education and networking system and is not exhaustive. The definition of self-organization is given by various scholars but everyone seemed to say clearly that evolution of a system is organized without the presence of a central process; the mechanism must equally constrain each other to perform as whole in order to attain a stable performance. Therefore self-organization is modeled mathematically, computationally or conceptually to help the interacting components and advances from a less organized state to a more organized state dynamically over some time, while exchanging energy, matter, and/or information with the environment (Prokopenko, 2009). The figure 1 shows the various interdisciplinary fields of self-organization.

In recent years mobile communication has enjoyed an unexpected rise in popularity. It is significantly increasing difficulty in terms of complexity of applications, heterogeneity of involved devices, radio access based technologies and dynamic nature etc., hence future mobile communication needs to have an adequate networking architecture that supports robustness, high degree of scalability, increasing performance, minimize the probability of failures and reliability in a cost effective manner without compromising quality of service and security. As a result, self-organized automation is introduced to develop Self-Organized Network (SON) in communication technology and as being a network themselves able to plan, optimize, operate, manage, monitor and self-heal by the way reduce administrative requirements for users and operators.

The SON is a cutting-edge advancement in communication technology and a promising solution for large scale networks to fight against increasing complexity, heterogeneity and dynamics in mobile communication systems. The motivation of self-organization for mobile communication technology comes from heterogeneity of devices, dynamics and scalable problem of networks, look forward to fast network communication services, autonomous reaction to problem, automation and distributed

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