Mobility diversifies Trust: Introducing TrustRings

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Abstract

Mobile wireless networks, such as Mobile Ad Hoc Networks, challenge research on Trust in many ways. Particularly, the introduction of mobility in combination with over-the-air communications makes traditional trust concepts, known mainly as Trust Centers, inadequate for securing data in mobile environments. In this paper, we focus on Trust establishment in mobile wireless networks and introduce the idea of TrustRings. The concept of TrustRings facilitates the calculation of Trust-Values for nodes in mobility networks based on an egocentric network model. Each node concentrates autonomously on the establishment of its own TrustRings by placing itself as the centric node in the middle of the network. Then, it starts building 3-dimensional spheres using the multiple of its own transmission range as the radius of each sphere. The innermost sphere is generated by exactly the transmission range of each node. By further iterating this process, the second sphere is created by using the doubled transmission range and so on. Furthermore, each node maintains a Trust-Value-Database to store the Initial-Trust-Value of other network participants, which results from positive and negative experiences with network participants only within the node’s direct transmission range. After a node has located its communication partner in a specific TrustRing, the Initial-Trust-Value offers the foundation for calculating the node’s Trust-Values within a specific TrustRing. The main advantage of the proposed model is that it takes the characteristics of mobile networks, such as uncertainty of reliable communication, into account and provides the opportunity to deploy a sophisticated Trust model.