A Prototype for Global Trust Management in Mobile Ambient Home Network

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ABSTRACT

This article developed a framework for trust management in mobile ambient home network with a view to secure the home devices and channel against attacks. The framework was designed using mobile ad hoc network and social networking concept. The trust management, global reputation aggregation which considered the direct and indirect communication of home devices and remote devices was employed to shield home devices from attacks. While real-time dynamic source routing protocol was employed to prevent the channel from attacks by selfish and malicious nodes. The prototype of the framework was implemented using C# programming language. The framework will enhance the activities in the home by securing the home network against unforeseen network disruption and node misbehavior due to the distributed nature of the environment.

Keywords: Ambient Home, Channel Attacks, Device Attacks, Framework, Trust Management

1. INTRODUCTION

The rapid development of mobile computing technology and social network services significantly facilitates the communication and resource sharing between mobile users that are socially interconnected with minimum required network infrastructure (Bhat et al., 2011). Social networks are particularly useful in the scenarios such as driving on a highway, train, cruise or plane which motivates the emergence of mobile ad hoc network (MANET) (Juan and Qiugrui, 2011).
MANET is a collection of autonomous nodes that communicates with each other by forming a multi-hop radio network and maintaining connectivity in a decentralized manner (Zheng et al., 2003).

Within the context of Ambient Intelligence (AmI), the concept of mobile ad hoc network is likely to play larger roles in the future in which people are surrounded and supported by small context-aware, cooperative and non-obstructive devices that will aid our everyday life (Anna, 2012). AmI is the capability of an environment populated with electronic devices to exhibit a certain degree of intelligence. To be perceived as intelligence, the whole environment must act in a smart way and this require that each single component in the environment actively coordinates with the others and at the same time is supervised by the rest of the environment so that the whole environment can remain coherent (Giacomo et al., 2005).

The main aim of AmI is to enhance the quality of life, offering to users’ relevant services such as communication, home control and automation, entertainment and home networking anywhere and at anytime. The nature of AmI home system which is life dependent necessitates the need for securing the home. Attacks in the AmI home can be on the communication channel or on the individual devices (Ingrid et al., 2005).

Mobile users’ of the social network will be automatically connected to the network based on their profiles, context such as location and social behaviors (Juan and Qiugrui, 2011). Because users of such network do not have any previous interactions, it is more important to establish an acceptable level of trust relationships among participating users.

Trust is an agent’s belief in attributes such as reliability, honesty and competence of the trusted agent (Bhat et al., 2011). Trust Management is the activities of collecting, encoding, analyzing and presenting evidence relating to competence, honesty, security or dependability with the purpose of making assessment and decisions regarding trust relationships (Grandison and Sloman, 2003). Previous research work revealed that security is a challenging issue in distributed computer networks as attackers are both inside and outside the network. There is always some vulnerability that can be exploited to break into a system, therefore the need for improvement. This research work seeks to develop and implement a trust management framework called Mobile Ambient Social Trust (MAST) for ambient home network. This framework will improve the security of the AmI home by establishing certain level of trust before a new user can be allow to interact with the system.

2. REVIEW OF RELATED LITERATURE

The review of the existing trust management model for mobile ad hoc network was done with a view to identify the research description, trust factors or methods considered and the obtained results. Some research proposal includes a spontaneous mobile social networks that is fully decentralized and self-managed, context aware Qos framework, multi-user communication environment by embedding H.323 components, fuzzy base trust and reputation model for distributed services oriented environment, effective use of grid resources and deployment using trust, adaptive trust model for large scale peer-to-peer network, evaluating grid entities trust in virtual organization, evaluating data centric reputation for Hadoop clouds, incorporating trust concept into MANET and building a subjective trust management model with multiple trust factors, addressing some limitations of existing trust and reputation models for web services, rating trustworthiness of other nodes without central authorities to build up a trust environment, trust management model that reason about future interactions between entities, design and evaluating reputation using factor graph and a computational trust framework that uses the perspective of information sharing. The trust factor were experience users, inexperienve users, similarities of the users profile, history of friendship, reputation and...
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