Software Defined Networking with Pseudonym Systems for Secure Vehicular Clouds

OBJECTIVE:

The main objective of the system The vehicular cloud is a   promising   new paradigm where vehicular   networking   and   mobile cloud computing are elaborately integrated to enhance the quality of vehicular information services.

ABSTRACT:

The vehicular cloud is a promising new paradigm where vehicular networking and mobile cloud computing are elaborately integrated to enhance the quality of vehicular information services. Pseudonym is a resource for vehicles to protect their location privacy, which should be efficiently utilized to secure vehicular clouds. However, only a few existing architectures of pseudonym systems take flexibility and efficiency into consideration, thus leading to potential threats to location privacy. In this paper, we exploit software-defined networking technology to significantly extend the flexibility and programmability for pseudonym management in vehicular clouds. We propose a software-defined pseudonym system where the distributed pseudonym pools are promptly scheduled and elastically managed in a hierarchical manner. In order to decrease the system overhead due to the cost of inter-pool communications, we leverage the two-sided matching theory to formulate and solve the pseudonym resource scheduling. We conducted extensive simulations based on the real map of San Francisco. Numerical results indicate that the proposed software-defined pseudonym system

significantly improves the pseudonym resource utilization, and meanwhile, effectively enhances the vehicles' location privacy by raising their entropy

INTRODUCTION:

With the rapid development of wireless communication technologies vehicles can utilize vehicle-to-infrastructure and vehicle-to-vehicle communications with the help of on-board devices to form vehicular networks. However, many emerging mobile applications require larger and secure storage and complex computation, and brings new resource challenges to vehicular networks, e.g., vehicle platoon , real-time video streaming application and vehicular augmented reality, social media sharing . To meet the growing demands of radio and computing resources, vehicular networks take the advantages of cloud computing and are evolving towards vehicular clouds. From a system-level view, idle resources in vehicles, network infrastructures (e.g., road-side unit (RSU)) and cloud infrastructures (e.g, data center) can be recruited to form a vehicular cloud system. A typical vehicular cloud system consists of three different levels as following. 1) At the bottom level, cooperative vehicles create a vehicular cloud. 2) At the middle layer, a set of adjacent RSUs form a local cloud. 3) At the top layer, central cloud manages resources in the system. While ubiquitous wireless communication of pervasive cloud computing greatly facilitate the formation and functioning of vehicular cloud, privacy and security challenges remain to be addressed for this new domain To secure vehicular clouds, we focus on pseudonym, which is an essential resource for vehicles to protect location privacy. Most of the privacy protection schemes are implemented on the basis of pseudonyms, e.g., group signature, silent pe-riod, and mix-zone . Vehicles should periodically change their pseudonyms to avoid being continuously tracked. More-over, a third-party cloud service provider may pose potential threats to the vehicles because of data leakage.

This further highlights the importance of pseudonyms for vehicles to protect privacy in vehicular clouds. Vehicles need to possess sufficient pseudonyms to be able to frequently change for anonymity.