Title: Preserving Location Anonymity of Sources and Sinks against Global Eavesdroppers

Abstract

Wireless sensor networks (WSNs) have been widely used in many target-tracking and monitoring applications in harsh environments as a feasible solution due to their self-configuration, the ability of sensing in a wide area, and their communication capacity. However, location information of targets obtained from the network can be used maliciously by attackers. For example, illegal ivory poachers may use the location information to detect an elephant’s location, which can be a lucrative deal. Therefore, preserving the location privacy is one of the essential issues in such applications. While many security schemes such as encryption and authentication protect the content of messages in WSNs, the contextual information, such as communication patterns, is left vulnerable and can be utilized by attackers to identify critical information such as the locations of event sources and message sinks. Existing solutions are mostly designed to protect individual source or sink location anonymity against limited eavesdroppers in a small region at a time. However, highly motivated, global eavesdroppers that can monitor entire communication events on WSNs can easily defeat them.

In this talk, we will discuss a mechanism for preserving location anonymity of sources and sinks against global eavesdroppers to grapple with these challenges. Our proposed scheme uses a small number of stealthy permeable tunnels such as wormholes and message ferries to scatter and hide the communication patterns. Unlike prior schemes, our scheme effectively achieves a high anonymity level for both source location and sink location, without incurring extra communication overhead. We quantify the location anonymity level and evaluate the effectiveness of our scheme via analysis and simulations. We also perform extensive evaluations and show the synergistic effect when our scheme is combined with other existing solutions.

Biography

Hyungbae Park is a Ph.D. student in CSEE at the University of Missouri – Kansas City. He received his B.E. degree in Computer Engineering from Kwangwoon University, Seoul, Korea and his M.S. degree in Computer Science from South Dakota State University, Brookings, South Dakota, USA. His research interests include security in sensor networks, software-defined networking, smartphone-based localization, network traffic/performance analysis and modeling, and fault tolerance computing systems.