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Practical access control for sensor networks in the context of the Internet of Things[☆]

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Abstract

Wireless sensor network (WSN) plays an important role in military sensing and tracking, target tracking, and environment monitoring. To query of the network to get useful information from anywhere and anytime, we need to integrate the WSN into the Internet as part of the Internet of Things (IoT). In this case, it is an important task to design an access control scheme that can authorize, authenticate and revoke a user to access the WSN. In this paper, we propose a heterogeneous signcryption scheme to control the access behavior of the users. We give the formal security proof of our scheme in the random oracle model. An important characteristic of our scheme is to allow a user in a certificateless cryptography (CLC) environment to send a message to a sensor node in an identity-based cryptography (IBC) environment. We give an access control scheme for the WSN in the context of the IoT using the proposed signcryption scheme. As compared with existing two access control schemes using signcryption, the computational cost of sensors in our scheme is reduced by about 22% and 53%, respectively and the energy consumption of sensors in our scheme is reduced by about 33% and 54%, respectively.

Keywords:

Internet of Things, Security, Signcryption, Certificateless cryptography, Identity-based cryptography.

1. Introduction

Wireless sensor networks (WSNs) are ad hoc networks which usually are composed of a large number of tiny sensor nodes with the capabilities of sensing, computation and communication [1]. WSNs have important application value in military sensing and tracking, target tracking, environment monitoring, and so on. For example, we can deploy a WSN to monitor the efficiency of each industrial equipment by measuring vibration, temperature, pressure, power quality, and so on. If a factory personnel find a potential

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