

Chapter 2

Trustworthy Architecture for Wireless Body Sensor Network

G. R. Kanagachidambaresan

Dhanalakshmi Srinivasan College of Engineering, India

ABSTRACT

Wireless Body Sensor Network is a collection of physiological sensors connected to small embedded machines and transceivers to form a monitoring scheme for patients and elderly people. Intrusion and foolproof routing has become mandatory as the Wireless Body Sensor Network has extended its working range. Trust in Wireless Body Sensor Network is greatly determined by the Encryption key size and Energy of the Node. The Sensor Nodes in Wireless Body Sensor Network is powered by small battery banks which are to be removed and recharged often in some cases. Attack to the implanted node in Wireless Body Sensor Network could harm the patient. Finite State Machine helps in realizing the Trust architecture of the Wireless Body Sensor Network. Markov model helps in predicting the state transition from one state to other. This chapter proposes a Trustworthy architecture for creating a trusted and confidential communication for Wireless Body Sensor Network.

1. INTRODUCTION

Design of Trusted network has become mandatory for Wireless Body sensor Network since its role is prodigious in Health monitoring system. Wireless Networks hold the key for unlocking 24 × 7 monitoring of patients in and out of hospital environment. Physiological signals of the patients are monitored across the clock

DOI: 10.4018/978-1-4666-8687-8.ch002

using sensors stucked with the body of the subject (Kanagachidambaresan, SarmaDhulipala, Vanusha, & Udhaya, 2011; Akyildiz, Sankarasubramaniam, & Cayirici, 2002; Kanagachidambaresan, Chitra, 2014; Otal, Alonso, & Verikoukis, 2009; Kanagachidambaresan, SarmaDhulipala, & Udhaya, 2011). Wireless Body Sensor Network is mainly used for two major e-health application scenarios one for monitoring and collecting health data of the subject and delivering this data to the remote medical centre. Second major application is automatic treatment by the cooperation of various biosensor nodes with the help of actuators. Wireless Body Sensor Network helps the subject from Asthma to Cancer monitoring and has very large application. A sensor node could be placed to monitor nitric oxide emitted by cancer cell to monitor the progress of cancer in the human body. A Wireless Body Sensor Network could help the asthma patients by sensing the allergic agents in the air and reporting the patient himself and doctor continuously avoiding him from breathing trouble. Fatal conditions due to belated medical facility can be majorly avoided using Wireless Body Sensor Network. The main motto of the Wireless Body Sensor Network is to enhance the patients mobility without making them immobile. Wireless Body Sensor Network helps in monitoring patients continuously without disturbing their day to day life (SarmaDhulipala, Kanagachidambaresan, Chandrasekaran, 2012; Riaz, et al., 2009; Zhang, Das, & Liu, 2006; Momani & Alhmouz, 2008; Boukerche, Li, & Khatib, 2006). Wireless Body Sensor Network facilitates the patients to be monitored out of hospital environment, making the network facile to attackers. For example McAfee experts demonstrated an attack to the insulin pump causing a fatal dosage of insulin in Black Hat conference in 2012. Health Insurance Portability and Accountability Act (HIPAA) mandates the e-health data to be secured and routed through trusted nodes. BSN mandates a valuable trust to the system before being practiced in real time. Trust for these miniaturized embedded systems should also convince with the limited available resource. The Nodes in the Wireless Body Sensor Network are wearable, stucked and implanted in nature. The first implantable heart pacemaker was designed by 1958, In spite to the advancement to the technology of manufacturing of Implantable Sensor Nodes faces a series of challenges varying with person to person and environment to environment (Marsh, 1994; Hoffman, Lawson, & Blum, 2006, Ng, Sim, & Tan, 2006; Pirzada & McDonald, 2004). Rechargeable batteries in the implanted nodes are charged by the radio frequency, ultrasonic, infrared light, low-frequency magnetic field and so on. Recent technology introduces the energy harvesting mechanism with body motions and bio-heat generation (Sun, Yu, Han, & Liu, 2006; Shaikh, et al., 2006; Momani, Challa, & Abour, 2007; Liu, Joy, & Thompson, 2004; Gradison & Sloman, 2000; Shi & Perrig, 2004). Future design of implanted nodes concentrates battery less node design directly harvesting energy and serving the need of the Wireless Body Sensor Nodes. The Trust of the nodes in these cases mainly depends on the

33 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/trustworthy-architecture-for-wireless-body-sensor-network/139426

Related Content

A Simulation Framework for the Evaluation of Frequency Reuse in LTE-A Systems

Dimitrios Biliou, Christos Bouras, Georgios Diles, Vasileios Kokkinos, Andreas Papazois and Georgia Tseliou (2014). *International Journal of Wireless Networks and Broadband Technologies* (pp. 56-83).

www.irma-international.org/article/a-simulation-framework-for-the-evaluation-of-frequency-reuse-in-lte-a-systems/115590

Sinkhole Attack Detection-Based SVM In Wireless Sensor Networks

Sihem Aissaoui and Sofiane Boukli Hacene (2021). *International Journal of Wireless Networks and Broadband Technologies* (pp. 16-31).

www.irma-international.org/article/sinkhole-attack-detection-based-svm-in-wireless-sensor-networks/282471

HTTP Traffic Model for Web2.0 and Future WebX.0

Vladimir Deart and Alexander Pilugin (2011). *International Journal of Wireless Networks and Broadband Technologies* (pp. 50-55).

www.irma-international.org/article/http-traffic-model-web2-future/53019

Harvesting Energy from Microbial Fuel Cells: Powering Wireless Sensor Networks Operating in Wastewater Treatment Plants

Pedro Serra and Antonio Vitoria Espirito-Santo (2016). *Biologically-Inspired Energy Harvesting through Wireless Sensor Technologies* (pp. 121-171).

www.irma-international.org/chapter/harvesting-energy-from-microbial-fuel-cells/149356

Multi-Standard Multi-Band Reconfigurable LNA

Mohd Tafir Mustaffa (2012). *Advances in Monolithic Microwave Integrated Circuits for Wireless Systems: Modeling and Design Technologies* (pp. 1-23).

www.irma-international.org/chapter/multi-standard-multi-band-reconfigurable/58485