

Preface

The Motivation for This Book

The past decade has witnessed the emergence of mobile Internet applications for diverse mobile devices, ranging from text-based office assistant utilities to multimedia-based online entertainment. The potential impact of heterogeneous wireless networks has been confirmed by an ever-increasing amount of mobile Internet traffic, which cannot solely be absorbed by cellular data communication networks, such as 3G networks. For example, more and more mobile telecommunication operators, including AT&T, Verizon Wireless, Vodafone, Orange, T-Mobile and China Mobile, are willing to deploy millions of Wi-Fi access points in urban areas to offload mobile Internet traffic from cellular networks. However, different from mature seamless roaming technologies of voice and data services in cellular networks, handover technologies in heterogeneous wireless networks still encounter many challenges, from both technical and administrative standpoints.

The main motivation for offering this book stems from the observation that, at present there is no comprehensive source of information about seamless and secure roaming over heterogeneous wireless networks. In addition to providing the latest information in this area, we also include recent research results and implementation details from two related projects, which we conducted from April 2007 to August 2011. Both projects were supported by the Hong Kong Innovation and Technology Fund. We believe there is value in bringing basic theoretical concepts and practical implementation together, which can facilitate a deep understanding of the entire area.

What This Book Is About

This book provides comprehensive coverage and detailed insights into the emerging area of seamless and secure roaming in heterogeneous wireless networks, which aims at a better user experience and security guarantees in different handover

scenarios. It helps the reader to understand the specifics in designing seamless and secure roaming protocols and applications, while introducing a solid set of general approaches, practical methods, and implementation concepts. Therefore, it can be seen as a textbook as well as a practical guide for the reader:

- To learn about mainstream technologies of heterogeneous wireless networks, and the different interworking approaches to achieving interoperation in different networks
- To understand the state-of-the-art technologies in seamless roaming over heterogeneous wireless networks, and the experiences and lessons from our practice in implementing the **HAWK** project
- To understand state-of-the-art technologies in secure enhancement on seamless roaming over heterogeneous wireless networks, and some experiences and lessons from our practice in implementing the **SHAWK** project

How This Book Is Organized

This book is divided into five chapters.

Chapter 1: Introduction. In this chapter, we will introduce the requirements for seamless and secure roaming in heterogeneous wireless networks, which are followed by the challenging issues in developing the relevant technologies.

Chapter 2: Wireless Technologies in Heterogeneous Wireless Networks. This chapter reviews related wireless communication and interworking technologies involved in heterogeneous wireless networks.

Chapter 3: Seamless Roaming over Heterogeneous Wireless Networks. First, we summarize the related work on handover management and mobility management in heterogeneous wireless networks. Then we describe some case studies of seamless roaming systems in our **HAWK** projects. The main objective of the **HAWK** project is to study and develop practical techniques and mechanisms for realizing seamless communication and mobility when mobile clients roam among advanced heterogeneous wireless networks.

Chapter 4: Secure Enhancement on Seamless Roaming. This chapter provides a solid set of security technologies and mechanisms for implementing the identified security requirements of seamless roaming over heterogeneous wireless networks. It also describes the implementation details of our **SHAWK** projects, whose main objective is to develop solutions to key security problems in providing ubiquitous and seamless Internet access over heterogeneous wireless networks.

Chapter 5: Summary. We will draw a conclusion for the whole book in the final chapter.



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