

Preface

Mobility management is the technology aiming to provide communication and service continuity for mobile objects (i.e., users, machines, and services). It originated from the cellular system as one feature in the specific network and developed continually as a general capability of networks in the following network evolution stages such as Internet, mobile Internet, non-infrastructure network, and Internet of Things (IoT). When prospecting the future mobility-driven network (MDN), it is envisioned that mobility plays an increasing role in communications and services, including mobility of humans in traditional mobile communications, mobility of machines in machine-to-machine (M2M) communications, mobility of contents in data-centric networks, mobility of service providers in new emerging applications, and mobility of computing resources in mobile cloud computing. The mobility as the inherent capability is used for implementing communications, networking, and applications. The mobility supporting will be one of the focuses going through the future network architecture developments and the essential technology research.

This book is based upon years of academic and industrial experiences in mobility management of the authors. It is the first book treating mobility management as an individual technology with systematic and insight view. The text has been prepared to provide fundamental concepts of technical principles and design philosophies yet avoiding discussions in protocol details.

The mobility management reference models proposed by authors are used in the book as the main track, offering multi-dimensional investigation and horizontal comparison of typical technologies. The model is used to explain profound theories in simple ways and simple languages, making it an excellent reference for the researchers, engineers, and students working in related areas.

This book covers major principles, technologies, and applications of mobility management technology. Chapters of the book are structured into three main parts.

Part I: Fundamental Concepts and Principles (Chaps. 1–4)

Chapter 1 provides an overview of the background, evolution, definitions, and classifications of mobility management, with brief introduction to standardization activities.

Chapter 2 presents reference models of the mobility management technology, including the protocol reference model identifying the critical control functions and network reference model abstracting the function entities. Typical mobility management technologies are analyzed accordingly.

Chapter 3 provides extensive discussions on technologies supporting different mobility objectives and highlights the technical principles rather than protocol details. This chapter is particularly useful for quickly understanding these technologies.

Chapter 4 discusses the applications of some mathematical theories in mobility management researches including mobility modeling, performance analysis, and algorithm design.

Part II: Classical Technologies and Applications (Chaps. 5–8)

Chapter 5 introduces the mobility management technology in the cellular communication system as the classical technology at the data link layer. Major network entities and control functions are abstracted and analyzed according to the reference models introduced in this book, especially the design principles in location management and handover control.

Chapter 6 selects Mobile IP (MIP) as the typical mobility management technology at the network layer. Extensive discussions on critical control functions in MIP are offered based on the reference models introduced in the book. Network mobility support capability of MIP is also discussed.

Chapter 7 takes the mobile Stream Control Transmission Protocol (mSCTP) as a typical protocol providing mobility support at the transport layer. Based on the introduction to existing schemes with explanations using their technical principles, mSCTP is introduced with in-depth analyses on the critical control functions.

Chapter 8 introduces the mobility support technology at the application layer, where Session Initiation Protocol (SIP) is taken as the typical protocol example. The control functions and its capabilities to support various mobility objectives are presented.

Part III: Future Requirements, Challenges, and Directions (Chap. 9)

Chapter 9 starts with analyses of the technical requirements of specific scenarios. Based on those requirements, the methodology-related challenges are derived and the research trends are presented.

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