

## Preface

Mobile multimedia communication is increasingly in demand because of the basic need to communicate at any time, anywhere, using any technology. In addition, to voice communication, people have a desire to access a range of other services that comprise multimedia elements—text, image, animation, high fidelity audio and video using mobile communication networks. To meet these demands, mobile communication technologies has evolved from analog to digital, and the networks have passed through a number of generations from first generation (1G) to fourth generation (4G).

Chapter I provides a brief description of the different generations of mobile communication networks including their standards, major services, and transmission rates. The characteristics of 4G from a users' point of view, as well as its major research challenges in terms of mobile terminals, network system, and mobile services will also be presented in this chapter.

With the rapid development of mobile communication systems, demands for the transmission of multimedia information using portable devices are increasing day by day. Chapter II demonstrates the effectiveness of transport layer handoff schemes for multimedia transmission, and is compared with that achieved by mobile Internet protocol (IP).

Understating the parameters that determine the suitability of a communication standard for the transmission of multimedia information for a particular application is of paramount importance for mobile system designers, users, and researchers. Chapter III describes multimedia applications needing the services of mobile network systems, and presents the fundamentals of issues involved in the delivery of multimedia content with the desired quality of service (QoS). Current and future challenges in achieving successful mobile multimedia information transmission are also discussed.

The personalized communication system is gaining more importance with an increase of communication ways due to the social reform by the technological advancement. Chapter IV introduces a personalized system for device independent and position aware communication, which is secure, scalable, and an open architecture. This chapter also presents the further research in this field.

The application of multimedia information in treatment or medical diagnosis using portable devices is proliferating with the development of mobile multimedia communication. Chapter V provides an overview of the existing therapy methods based on paper materials and mobile electronic devices in the current literature, and proposes the software solutions for the patients, the careers, and the professional speech and language therapists (SLTs), which could be accessible by mobile devices such as personal digital assistants (PDA). Finally, the recommendations for the direction of future research and development are made in this chapter.

As the mobile services play a role in the reforming of the social culture as well as creating a tremendous business opportunity, it is important to assess the acceptance of these services. The analysis and critical assessment of the existing theoretical acceptance models about the evolving mobile services and their underlying technologies is given in Chapter VI. Chapter VI also introduces an acceptance model for mobile services in the bedrock of the technology acceptance model and recommends the further research directions.

With the significant influence and increasing requirements of visual mobile communications in our day-to-day life, low bit-rate video coding to combat against the stringent bandwidth scarcity of the mobile-networks has become a prime research area in the recent time. Chapter VII presents a review of the image and video coding techniques suitable for mobile communications to provide the readers with a means of appreciating the wealth and radical advancement of the field, and also attempts to enlist and sketch the physical significance of the various important and popular quality metrics of the image and video coding techniques.

In the orthogonal frequency division multiplexing (OFDM) scheme, the total bandwidth can be split into many narrowband sub-channels. Therefore, it can avoid any multiple access interferences in the base station receiver, and use a subcarrier-specific adaptive modulation schemes. In Chapter VIII, a flexible frequency division multiple access scheme based on OFDM-FDMA and a radio resource management (RRM) employing dynamic channel allocation techniques are developed.

Ad-hoc network is another dimension of wireless networks, which has been a demanding field of research because of not having a predefined infrastructure. Wireless nodes are dynamically connected in an arbitrary manner to perform a particular emergency operation. This, therefore, makes the routing of a message promising and challenging. The state-of-the-art, the contrast and comparisons, and the related research challenges of ad-hoc routing protocols have been articulated in Chapter IX.

With the proliferation of network technologies, especially the wireless multimedia communication, Internet and sensor networks, the demand for ubiquitous computing is progressively rising in every aspect of human life, ranging from remotely controlling the home appliances, to security and health monitoring. The overview of ubiquitous networking including its infrastructure, its influence on human lives, its applications and services, and its global evolution are presented in Chapter X.

As with social security and privacy, the security and privacy of all wireless communication services is of paramount importance. Chapter XI aims to present an overview of the security and privacy issues by highlighting the need to secure access to wireless networks and the loss that might accrue from the breach of a network. The vulnerabilities of the IEEE 802.11 and Bluetooth networks, as well as a paradigm for secure wireless networks are presented in this chapter.

Portable devices such as PDA and mobile sets are vulnerable to security threats because of their limited size and processing capabilities, openness, and access to air interface. The security architecture of the mobile devices including the security policy, access control, and physical and storage protection are described in Chapter XII. Chapter XII also articulates the security related to cellular communication networks, Wireless LAN, and Bluetooth.

The security of ad-hoc networks has been a difficult task to the recent research community due to a dynamic network topology, vulnerability of air interface to attacks, mobility of a node in any context and resource constraints. Chapter XIII provides the descriptions of various network layer security at-

tacks of ad-hoc networks, as well as the security protocols that protect network layer from a number of attacks.

Pervasive computing provides the computing and communication technology to integrate the everyday works based on the philosophy of existence everywhere, but access at the same time. Therefore, this poses some inherent limitations that make it even more vulnerable to security attacks than mobile computing. In Chapter XIV, the state-of-the-art of pervasive security, privacy and trust, their challenges and requirements for pervasive applications, and some open issues related in this field have been described.

Finally, this book presents the state-of-the-art and research challenges of mobile computing and its next evolutionary step—ubiquitous and pervasive computing. In addition, the security issues related to these topics have also been elaborately depicted. Therefore, understanding these technologies help readers to have an in-depth idea of mobile multimedia communication infrastructure and its current and future research.

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