

Preface

With the rapid development of mobile communication technologies and the ever-increasing population of users, mobile social network (MSN) has become an emerging paradigm of the next-generation network. The basic tenet of MSNs is that mobile users can form communities at any time and anywhere to exchange information with each other based on their interests, social tie, social activities, etc. Therefore, MSNs can facilitate a myriad of attractive applications related to social and communication services, including content delivery, community activities, and infotainment.

Due to the advance of social applications, it is necessary for MSNs to provide quality of experience (QoE), which poses new challenges of modeling and optimization in MSNs as follows: (1) there is a huge amount of information to be disseminated over MSNs. The characteristics of users during information dissemination should be studied including the social tie among users, interests in information, etc. An analytical model to optimize the information dissemination is needed; (2) with the new demands of social networks applications such as crowd sensing, users are encouraged to participate in MSNs to not only receive content, but also contribute the content. As some users may be selfish, an incentive model is necessary to encourage users to actively participate the MSNs; (3) in MSNs, the content-delivery path between the source and the destination is unstable or even unavailable sometimes. A store-carry-forward pattern is applied to deliver content to the destination in MSNs, where this delivery fashion needs the optimal relay services; (4) the resources such as the available bandwidth in MSNs are limited. Since the emerging social network applications may have different requirements of resources, the optimal bandwidth allocation becomes important to provide users with the satisfied mobile network services; and (5) various users take different types of mobile devices to access the MSNs through different wireless connections. A model based on the heterogeneous network architecture is needed to optimize the network architecture for MSNs.

In this monograph, we study the modeling and optimization for MSNs, since it is of great importance to address the above challenges and facilitate newly developed applications. In Chap. 1, an overview of MSNs is provided, by specifying the

critical challenges, research issues, and emerging applications in MSNs. In Chap. 2 with the introduction of MSN-based social graph and information dissemination mechanism, the modeling and optimization for epidemic information dissemination in MSNs are discussed. In Chap. 3, by the analysis of the selfishness division of users, we present the modeling and optimization of selfishness-aware incentive to encourage users to participate cooperation in MSNs. In Chap. 4, based on the store-carry-forward fashion of content delivery, we present an optimal relay service for users. In Chap. 5, to deliver social multimedia through clouds, we study the modeling and optimization for cloud resource allocation in MSNs. In Chap. 6, by introducing small cells and macro-cell, the modeling and optimization for heterogeneous MSN architecture are investigated to deliver social contents in a content-centric mode. Finally, in Chap. 7, we present some open issues and future research directions in MSNs. In summary, this monograph validates the feasibilities of modeling and optimization for MSNs including epidemic information dissemination, selfishness-aware incentive, relay services, cloud resource allocation, and heterogeneous network architecture. It also evaluates the performance of the above studies. Therefore, this monograph provides valuable insights on the design and deployment of future MSNs.

We would like to thank Prof. Pinyi Ren at the Department of Communication and Information of Xi'an Jiaotong University, Xi'an, China; Prof. Song Guo at the School of Computer Science and Engineering of the University of Aizu, Aizu, Japan; Prof. Mianxiong Dong at the Department of Information and Electronic Engineering of Muroran Institute of Technology, Muroran, Japan; Prof. Yuan Wu at the School of Information Engineering of Zhejiang University of Technology, Zhejiang, China; Dr. Shan Zhang, at the Department of Electrical and Computer Engineering of University of Waterloo, Waterloo, Canada for their contributions in the presented research works. We would like to thank all of the members of BCCR group, University of Waterloo, Canada, for their valuable discussions, insights, and helpful comments. We would also like to thank the staff at Springer Science+Business Media: Ms. Susan Lagerstrom-Fife and Ms. Jennifer Malat, for their kind help throughout the publication and preparation processes.

Shanghai, China
Shanghai, China
Waterloo, Canada
Waterloo, Canada

Zhou Su
Qichao Xu
Kuan Zhang
Xuemin (Sherman) Shen

Modeling and Optimization for Mobile Social Networks

Su, Z.; Xu, Q.; Zhang, K.; Shen, X.S.

2016, XII, 119 p. 41 illus., Hardcover

ISBN: 978-3-319-47921-7