Chapter 6
Conclusions

In this book, we provide an overview of the application of auctions in the wireless communication market. In particular, we introduce detailed designs of three auction schemes in different scenarios from Chaps. 3 to 5.

In the first work, we study the redistribution of heterogeneous channels among multiple sellers and buyers via a double auction mechanism. To overcome the challenges brought by the heterogeneity of the channels in terms of interference range, we design a novel truthful double auction framework called TAHES. TAHES increases spectrum utilization through spectrum reuse. TAHES can not only solve unique challenges caused by spectrum heterogeneity but also preserve nice economic properties: Truthfulness, Budget Balance and Individual Rationality.

In our second work we aim to build a group-buying framework for spectrum trading. In secondary spectrum markets, users in secondary networks may want to bid for spectrum frequencies. But individual users with limited budgets cannot afford the whole spectrum block. Inspired by the emerging group-buying services on the Internet, e.g., Groupon, we propose that users can be voluntarily grouped together to acquire and share the whole spectrum band. We present a three-stage auction-based framework for this problem.

In the third work, we study the spectrum auction in primary market. In wireless markets, major operators buy spectrum through auctions hold by spectrum regulators and serve end users. How much spectrum should an operator buy and how should he set the optimal service tariff to maximize his own benefits are challenging and important research problems. We jointly study the spectrum holder's strategy in the auction and the WSPs' strategies in service provisions. We point out the relationship between their optimal strategies. To meet the WSP's flexible requirements, we design a flexible auction scheme (Flexauc), a novel auction mechanism to enable WSPs to bid for a dynamic number of channels. We prove theoretically that Flexauc not only maximizes the social welfare but also preserves other nice properties: truthfulness and computational tractability.