

عنوان مقاله:

Achieving Simultaneous Spectrum Utilization and Revenue Improvements in Practical Wireless Spectrum Auctions

محل انتشار:

دوفصلنامه مهندسی مخابرات، دوره 2، شماره 2 (سال: 1392)

تعداد صفحات اصل مقاله: 18

نویسندگان:

M.A. Pourmina

H. Bakhshi

H. Navidi

M. Mazoochi

خلاصه مقاله:

Spectrum is a valuable, scarce and finite natural resource that is needed for many different applications, so efficient use of the scarce radio spectrum is important for accommodating the rapid growth of wireless communications. Spectrum auctions are one of the best-known market-based solutions to improve the efficiency of spectrum use. However, Spectrum auctions are fundamentally different from conventional auctions because of the spectrum's unique property of reusability. Unlike traditional goods, the spectrum can be spatially reused concurrently. To handle spectrum reusability, a buyer grouping procedure has been applied in many existing spectrum auction schemes, in which the buyers' interference conditions are modeled as conflict graph. Buyer grouping problem can be transformed into the problem of finding chromatic number or maximum independent set of a graph, which is NP-hard and there is no efficient algorithm till now. Several approximate algorithms have been proposed to tackle the spectrum reuse problem. It is important to note that almost none of the proposed algorithms for spectrum buyer grouping have been specifically designed for spectrum allocation. However, buyer grouping in a practical spectrum auction mechanism has its own challenges. In this paper, first we illustrate the challenges of buyer grouping in a practical spectrum auction mechanism. Then we propose the novel algorithms for spectrum buyer grouping to solve these challenges. By extensive simulations, we show that our proposed algorithms can not only solve the challenges caused by radio spectrum properties but also provide good performance on various auction metrics.

کلمات کلیدی:

Buyer Grouping, Heterogeneity, Spectrum Auction, Spectrum Reuse, Truthfulness

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