

Game-Theory-Based on Downlink Spectrum Allocation in Two-Tier Networks

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Abstract : The capacity of conventional cellular networks has reached its upper bound and it can be well handled by introducing femtocells with low-cost and easy-to-deploy. Spectrum interference issue becomes more critical in peace with the value-added multimedia services growing up increasingly in two-tier cellular networks. Spectrum allocation is one of effective methods in interference mitigation technology. This paper proposes a game-theory-based on OFDMA downlink spectrum allocation aiming at reducing co-channel interference in two-tier femtocell networks. The framework is formulated as a non-cooperative game, wherein the femto base stations are players and frequency channels available are strategies. The scheme takes full account of competitive behavior and fairness among stations. In addition, the utility function reflects the interference from the standpoint of channels essentially. This work focuses on co-channel interference and puts forward a negative logarithm interference function on distance weight ratio aiming at suppressing co-channel interference in the same layer network. This scenario is more suitable for actual network deployment and the system possesses high robustness. According to the proposed mechanism, interference exists only when players employ the same channel for data communication. This paper focuses on implementing spectrum allocation in a distributed fashion. Numerical results show that signal to interference and noise ratio can be obviously improved through the spectrum allocation scheme and the users quality of service in downlink can be satisfied. Besides, the average spectrum efficiency in cellular network can be significantly promoted as simulations results shown.

Keywords : femtocell networks, game theory, interference mitigation, spectrum allocation

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