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## Efficient and Optimal Mechanisms with Radio Spectrum Sharing

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## HIGHLIGHTS

- Optimal mechanism design with spectrum sharing differs from the traditional setting mainly in that non-interference constraints need to be taken into account explicitly.
- Under regularity conditions about value distributions and non-interference constraints, we show that efficiency (optimality) typically involves spectrum sharing by multiple users, and the exact allocation of transmitted power is determined such that the ratio of marginal value (virtual value) over marginal cost (in terms of the cost to the interference generated) is equal among all shared users.
- Efficient and optimal mechanisms in our setting are dominant-strategy incentive compatible.
- Efficient and optimal mechanisms can also be implemented by well-designed all-pay or discriminatory-price auctions.

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