A cooperative multihop radio resource allocation in next generation networks

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Abstract

With the objectives of improving 3G networks coverage by using relaying nodes, a game theoretic approach to radio resource allocation for the downlink capacity is introduced. One of the basic issues not examined in the literature is the importance of fair resource sharing among mobile nodes located along a multihop link. We describe a novel technique for providing a resource allocation mechanism in a multihop relaying network. The resource allocation problem is formulated as a cooperative game using Nash Bargaining Solution (NBS), which allows mobile nodes to fairly share a downlink bandwidth among themselves. Sharing of the downlink capacity between multiple nodes using a noncooperative approach is inefficient when the radio resource is scarce. If upstream nodes manipulate their location at the head of the multihop link to exploit the downlink capacity, downstream nodes will suffer disproportionately. The undesirable properties can be avoided by means of a cooperative agreement in which all nodes share the radio resources equally, where downstream nodes are allowed to pay compensation to prevent upstream nodes from exploiting the downlink capacity and encourage them to cooperate. © 2005 IEEE.

Keywords

Cooperative games, Multihop, Nash Bargaining Solution, Resource allocation