Computer Science > Information Theory

Effective Capacity of Two-Hop Wireless Communication Systems

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A two-hop wireless communication link in which a source sends data to a destination with the aid of an intermediate relay node is studied. It is assumed that there is no direct link between the source and the destination, and the relay forwards the information to the destination by employing the decode-and-forward scheme. Both the source and intermediate relay nodes are assumed to operate under statistical quality of service (QoS) constraints imposed as limitations on the buffer overflow probabilities. The maximum constant arrival rates that can be supported by this two-hop link in the presence of QoS constraints are characterized by determining the effective capacity of such links as a function of the QoS parameters and signal-to-noise ratios at the source and relay, and the fading distributions of the links. The analysis is performed for both full-duplex and half-duplex relaying. Through this study, the impact upon the throughput of having buffer constraints at the source and intermediate relay nodes is identified. The interactions between the buffer constraints in different nodes and how they affect the performance are studied. The optimal time-sharing parameter in half-duplex relaying is determined, and performance with half-duplex relaying is investigated.

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