

Relay Selection strategies in Wireless Cooperative Networks

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Wireless networking provides easy connectivity and fast deployment, but presents low performance levels. Major limitations come from the shared medium and the unstable wireless channels. Recently, cooperative networking techniques have been investigated to increase performance, reliability and capacity of wireless networks by using the diversity created by different single antenna devices.

Wireless cooperative relaying poses several challenges, specially in the presence of mobile nodes. A major set of challenges are related to relay selection, which aims to identify the most suitable relay(s) to assist transmissions between any two pairs of nodes.

Research is ongoing to devise efficient relay selection at MAC layer. Such approaches are mostly source-based or destination-based. In source-based approaches, the source maintains a table containing the state of neighboring devices to support relay selection, if necessary. In destination-based approaches, the destination decides whether to use relaying or not. For this, threshold-based comparisons are used at destination and at relays. Both approaches incur in some overhead (specially the source-based ones) and are not efficient to provide a fast reaction to network changes.

Our 802.11 backward compatible relay selection strategy, "Relaying on Spot", aims to ensure accurate and fast relay selection, posing minimum overhead and reducing the dependency upon channel estimations, in scenarios where mobile nodes are moving fast. In "Relaying on Spot", relaying decisions take place at potential relay nodes, based on a balanced usage of inter-relay cooperation and opportunistic relaying. Intermediate nodes take the opportunity to relay in the presence of local favorable conditions (e.g. no concurrent traffic) and absence of relaying attempts by any other node. Cooperation between relays is activated as soon as another potential relay heard that the first relay attempt reached the destination in poor condition.