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Multi-Channel Opportunistic Routing

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Multi-Channel Opportunistic Routing

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Abstract. We propose and investigate Multi-Channel Extremely Opportunistic Routing (MCExOR) which is a protocol that extends Extremely Opportunistic Routing by utilizing multiple RF channels in multi-hop wireless networks. Large numbers of transmissions per end-to-end delivery combined with interference are the main reasons for the low capacity of wireless multi-hop networks. MCExOR reduces the overall number of transmissions in wireless multi-hop networks by opportunistically skipping nodes in a packet's forwarding path. The use of multiple non overlapping RF channels contributes to the reduction of overall interference.

In contrast to other approaches MCExOR only needs one RF transceiver per device. We present an algorithm for packet forwarding and show with the help of simulations that MCExOR outperforms traditional protocols like ad-hoc on-demand distance vector routing through the simultaneous use of multiple RF channels. In combination with realistic radio propagation models a further increase in the throughput is observed due to the opportunistic feature of MCExOR. With the increasing number of RF channels the overall throughput increases superproportionally. MCExOR with 2 RF channels surpasses AODV by an average of 140%. Unlike other multi channel approaches even a single packet flow can benefit from the existence of multiple channels. Finally, MCExOR is more robust than traditional protocols since it offers a higher end-to-end packet delivery.

Keywords: Algorithms, Computer networks, Communication system routing, Wireless LAN.

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