RRM for Optimising Multi-Radio Wireless Mesh Networks Deployments

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Abstract:

Wireless mesh networks are an efficient solution for Internet access provision in areas without fixed infrastructure. A centralised energy-efficient and load-aware strategy is proposed for the unified management of radio resources of multi-radio nodes, combining rate adaptation, power control, gateway rate-control and channel assignment mechanisms. An analysis of various hexagonal deployments and scenario sizes shows that the strategy exploits 100% of the mesh network theoretical capacity, guarantees a fair throughput to nodes, and minimises spectrum and power usage. For a 100 m radius scenario, using 802.11a for mesh and 11b/g for access, the maximum theoretical throughput of 57.7 Mbps is achieved with a hexagonal deployment of 2 rings (19 access points) and 4 channels for mesh and 3 for access. For a user density of 10 000 users/km2, of which 5% are active, this corresponds to an offered capacity of 3 Mbps per user.