# Abstract

Increasing capacity in wireless mesh networks can be achieved by using multiple channels and radios. By using different channels, two nodes can send packets at the same time without interfering with each other. To utilize diversity of available frequency, typically cards use channel-switching, which implies significant overhead in terms of delay. Assignment of which channels to use needs to be coupled with routing decisions as routing influences topology and traffic demands, which in turn impacts the channel assignment.

Routing algorithms for wireless mesh networks differ from routing algorithms that are used in wired networks. In wired networks, the number of hops is usually the only metric that matters. Wireless networks, on the other hand, must consider the quality of different links, as it is possible for a path with a larger amount of hops to be better than a path with fewer hops.

Typical routing protocols for wireless mesh networks such as Optimized Link State Routing (OLSR) use a single path to send packets from source to destination. This path is precomputed based on link state information received through control packets. The consideration of more information than hop-count in the routing process has shown to be beneficial as for example link quality and physical layer data rate determines the quality of the end-to-end path. In multi-channel mesh networks, also channel switching overhead and channel diversity need to be considered as a routing metric. However, a major drawback of current approaches is that a path is precomputed and used as long as the path is available and shows a good enough metric. As a result, short term variations on link quality or

channel switching are not considered.

In this thesis, a new routing protocol is designed that provides a set of alternative forwarding candidates for each destination. To minimize delay (from both transmission and channel switching), a forwarding mechanism is developed to select one of the available forwarding candidates for each packet. The implementation was tested on an ARM based multi-radio platform, of which the results show that in a simple evaluation scenario the average delay was reduced by 22 % when compared to single path routing.