HIQP: A HIDDEN NODE AND INTERFERENCE AWARE CHANNEL ASSIGNMENT SCHEME FOR MULTI-RADIO MULTI-CHANNEL WIRELESS MESH NETWORKS

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ABSTRACT. Carrier sense interference and hidden terminal problem are two critical factors, which limit the performance of wireless mesh networks. In order to increase the throughput of the network, multi-radio and multi-channel technology has been put forward to address this problem, since more channels can be used simultaneously to avoid collisions. In this paper, we propose “HIQP”, a new scheme for hidden node and interference aware channel assignment, in which both hidden terminal problem and carrier sense interference are taken into consideration. This scheme is put forward in the link layer instead of network layer, which is a pre-determined approach. Our simulation results show that this optimum channel assignment scheme which has the least carrier sense interference and hidden terminal problem will be proposed before the establishment of network infrastructure.

Keywords: WMNs, Hidden terminal problem, Carrier sense interference, Channel assignment, Pre-determined

1. Introduction. Wireless Mesh Networks (WMNs) have attracted a lot of attention due to the wide coverage, convenient access and robustness. They are multi-hop wireless networks which are composed of wireless mesh routers (MRs) and mesh end devices. Since the capacity of single-radio mesh networks is seriously affected by the nature of half-duplex of the wireless medium [1], multi-radio and multi-channel wireless mesh networks are widely noticed [2, 3]. In multi-radio multi-channel WMNs, how to assign the appropriate channels to appropriate radios to maximize the throughput of network is a key problem. A simple way to realize multi-radio and multi-channel is to make use of static channel assignment. However, with the increased number of wireless APs, the adjacent AP might use the same channel as well, which will cause conflicts [4, 5, 18] mainly resulting from two major problems, Carrier Sense Interference and Hidden Terminal Problem [5, 16, 17, 18]. The former problem is caused by interferences among nodes within the same carrier sense range. The problem will happen when a pair of nodes on a path communicates towards a common destination, which is called intra-flow interference, or among nodes on adjacent paths involved in different flows, which is called inter-flow interference [7]. The