

QoS AND MOBILE TECHNOLOGIES

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CHAPTER 30

CHALLENGES IN MULTI-RADIO MULTI-CHANNEL WIRELESS MESH NETWORK

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30.1 INTRODUCTION

Channel assignment in multi-radio multi-channel wireless mesh network is still a challenging problem. The main question is how to assign a feasible channel for each radio to maximize the network throughput. Many solutions have been proposed by researchers. These proposals can mainly be categorized into static and dynamic strategies, based on how frequently interfaces are switched from one channel to another. Wireless mesh networks (WMN) [1] has been widely implemented to provide the last mile wireless broadband access because of its multi-hop nature and stability. WMNs consist of two kinds of network elements namely, mesh routers and mesh clients. While the mesh routers form the backbone, the mesh clients are the users that generate traffic in the network; Figure. 1 shows the WMN architecture. When more clients are added to WMNs, there is a requirement to improve the transport capacity of the backbone. WMN configuration and management is still attracted by many challenging issues. The assignment of channels to radios in case mesh routers are equipped with multiple radios is one of these issues. In such a case, mesh routers may exploit the availability of multiple radios to simultaneously transmit and/or receive on different frequency channels. This will increase the throughput if the assignment of channels to radios is carefully planned.

30.2 CLASSIFICATION OF CHANNEL ASSIGNMENT SOLUTION

There are currently two approaches of channel assignment, that is, static approach and dynamic approach. In static channel assignment, such as [2], [3], [4], each interface of every mesh router is assigned a channel permanently or for long interval. In dynamic channel assignment, such as [5], [6], [7], an interface is allowed to switch from one channel to another channel frequently. Both strategies have their advantages and disadvantages. Static strategies do not require interfaces to switch channels frequently, and thus have lower switching overhead. However, they depend on stable traffic patterns in the network. Dynamic strategies require frequent channel switching, and thus have higher overhead than static strategies, in addition to more packet loss, traffic disruption in the network. However, the channel