

Chapter 14

Classification of Handoff Schemes in a Wi-Fi-Based Network

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ABSTRACT

Handoff management of the users is one of the major issues wi-fi-based wireless LAN. The total handoff process can be divided into three phases, namely scanning, authentication, and re-association. If mobile client frequently changes its position while accessing internet, number of handoffs also increases proportionally. Frequent handoffs affect the quality of service of different wireless applications because of large handoff latency. Many schemes have been developed for reducing handoff delay. In this chapter, handoff management schemes have been classified based on the phase in which the scheme works. Thus, the techniques have been classified as scanning-based schemes, authentication-based schemes, and re-association-based schemes. This chapter also classifies the handoff schemes into two categories based on the number of radios used: single-radio-based handoff schemes and multi-radio-based handoff schemes. The schemes under each of the class have been discussed in detail. A comprehensive comparison of all the schemes has also been presented in this chapter.

INTRODUCTION

Now-a-days IEEE 802.11 standards have become popular for providing wireless communication. Its application is increasing day by day. Wireless Local Area Network (Crow, Widjaja, Kim, & Sakai, 1997) has been widely used for mobile internet services. Based IEEE 802.11 wireless network, LAN systems are becoming popular in different areas like airports, cities, shopping malls etc (Akyildiz, Altunbasak, Fekri, & Sivakumar, 2004). Handoff is one of the critical issues in IEEE 802.11 based wireless network. For ensuring Quality of Service (QoS) of different wireless applications seamless handoff (Zeng,

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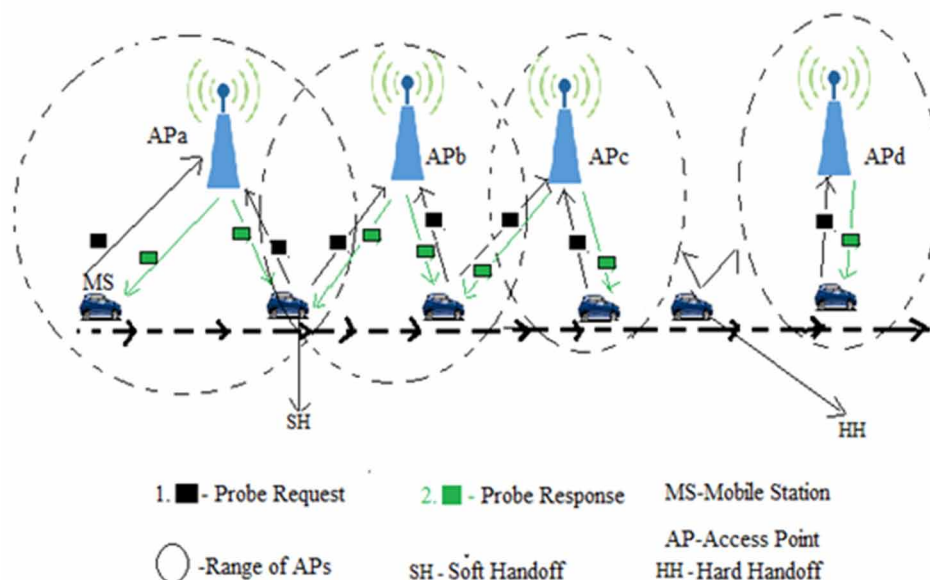
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& Agrawal, 2002) is an important factor. Handoff is the process of transferring data or call from one mobile network to another or from one channel to another because of node's movement. In another way handoff can be defined as, when a mobile user travels from coverage area of one Access Point (AP) to another while transferring data, all the data transfers should be shifted to the new one.

Wireless network consists of many wireless APs. Each of the AP is capable of providing communication (Pack, Choi, Kwon, & Choi, 2007) services to the clients or mobile users in local or roaming area. Each AP can only serve up to a certain area and number of mobile clients. So, when a mobile node reaches out of the coverage area any AP and enters into another AP's coverage area, handoff process is initiated (Khan, Aissa, & Despina, 2009). A handoff may also be triggered when the number of mobile clients served by a particular AP has already reached the maximum limit. There are basically two types of handoff in wireless network namely, hard handoff and soft handoff. In hard handoff (Prakash, & Veeravalli, 2000) when a mobile is shifting from the coverage area of one base station to another, first it disconnects from current base station and then reconnects to the next new one. In soft handoff (Kim, & Sung, 1999) when signal strength of the current base station is poor, the mobile node joins other base station which is serving good signal strength. Figure 1 shows an example scenario of soft and hard handoff. In real scenario, soft handoff is better than hard handoff.

There are mainly three phases in the handoff process namely, scanning or discovery phase, authentication phase and re-association phase. In scanning or discovery phase mobile client gathers the information about nearby APs. After completion of discovery phase, mobile client associates with an AP and perform authentication operation. Last phase of the handoff process is re-association phase. In this phase, mobile client sends re-association request message to new AP and the AP replies with positive response. Then mobile client starts data communication with new AP. Among the three phases, scanning phase is the most time consuming phase. In this chapter, handoff management schemes have been classified based on the phase in which the schemes work. Thus, the techniques have been classified as: scanning

Figure 1. Example scenario



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