Improving Video Conferencing Application Quality for a Mobile Terminal through Cognitive Radio

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Abstract—Cognitive radio (CR) is a form of wireless communication in which a transceiver can intelligently detect which communication channels are in use and which are not, and instantly move into vacant channels while avoiding occupied ones. This optimizes the use of available radio-frequency (RF) spectrum while minimizing interference to other users. In this paper, we propose a new approach which uses the CR for improving video conferencing application quality for a cognitive radio mobile terminal (CRMT). We also show through experimentation the interest of our approach.

Keywords-Cognitive radio, wireless network, mobility, handover, K-nearest neighbors.

I. INTRODUCTION

The Cognitive Radio (CR) was presented officially by Joseph Mitola in 1999, and since, this concept has been very popular with researchers in several fields such as telecommunications, artificial intelligence, and even philosophy. Joseph Mitola has defined the CR as "a radio that employs model-based reasoning to achieve a specified level of competence in radio-related domains" [1].

Applications are often included in its definition because of the compelling and unique applications afforded by CR. Additionally, there are many existing software radio techniques that CR is expected to enhance. The following are frequently advocated applications of cognitive radio [2]:

- Improving spectrum utilization and efficiency.
- Improving link reliability.
- Advanced network topologies.
- Automated radio resources management.

Most researches on CR networks have focused on the exploitation of unused spectrum. However, the CR nodes possess the necessary qualities to make a considerable progress in the reliability of wireless networks [2], which has been less explored, so that is why we were interested by improving wireless link reliability.

Connecting mobile users generally consists of a series of fixed and mobile networks. Any consideration of reliability must take into account the end to end network connection.

components. Traditionally, the wireless link access is seen as the weakest link, and many techniques such as channel coding and diversity have been proposed to the physical layer to improve the quality of radio link [6].

The aim of our paper is to propose a technique to improve wireless link reliability using the CR. For this, it seemed appropriate to choose a CR application and imagine the scenario on which we will apply our approach. Our technique is based on machine learning.

In this paper, we describe the scenarios proposed to improve video conferencing application quality for a CRMT and the results of our experimentation.

II. SCENARIOS AND PROPOSED SOLUTIONS

A. Scenario

The Figure 1 below shows a path followed by a mobile subscriber when it switches to an area where the signal quality drops to an unacceptable level (shown in red) due to a gap in coverage, we assume that the client uses video conferencing over the route.

Figure 1. Signal quality associated to a cognitive radio

B. Proposed Solution

After several incidents, the CR should be aware of the problem. Then, through some geolocations or the ability to learn the time of the day when this happens, the radio can anticipate the difference in coverage and know the necessary